Joint Conference

8th Organic Chemistry Conference
and
4th Science & Engineering of Polymeric Materials

OCC & SEPM 2023

Organized by the

Tunisian Chemical Society

10-14 May 2023

Blue Marine Hotel, Yasmine Hammamet, Tunisia

Abstracts of Lectures and Communications
List of Participants

Tunisian Chemical Society - Short Program of OCC & SEPM 2023

	Wednesday 10 May 2023
14.00 - 17.00	**Welcoming participants, distribution of documents and check in**
17.00 – 17.30	**Opening Ceremony**
17.45 – 18.20	**Lecture 1** **David MECERREYES** *POLYMAT University of the Basque Country, Donostia-San Sebastian, Spain*
18.20 – 18.55	**Lecture 2** **Pierre H. DIXNEUF** *University of Rennes, Institut des sciences chimiques, France*
19.30	***Dinner***
	Thursday 11 May 2023 (Morning)
09.00 – 09.35	**Lecture 3** **Adel NEFZI** *Florida International University. Center of Translational Sciences, Florida, USA*
09.35 – 10.10	**Lecture 4** **Amitav SANYAL** *Bogazici University, Istanbul, Turkey*
10.10 – 10.25	**Intervention** **CHUWAH Clifford Darah** - Senior Editor / Middle East and Africa - Springer Chemistry Africa: An opportunity for Chemical Sciences in Africa
10.25 – 10.35	**Gathering for the group photo**
10.35 – 11.15	**Poster Session 1 (P 1 - P 33) Alphabetical Order** **Evaluators:** Ayhan Oral, Gülen Türker
11.15 - 12.45	**Oral Communications - Session 1 : OC 01 - OC 06**
13.00	***Lunch***
	Thursday 11 May 2023 (Afternoon)
15.00 – 15.35	**Lecture 5** **Jean-Charles MAJESTE** *Ingénierie des matériaux Polymères, Université Jean Monnet, Saint-Etienne, France*
15.45 - 17.00	**Oral Communications - Session 2 : OC 07 - OC 11**
17.00 – 17.45	**Coffee Break + Poster Session 1 (P 1 - P 33) Alphabetical Order**
17.45 - 19.00	**Oral Communications - Session 3 : OC 12 - OC 16**
19.30	***Dinner***
	Friday 12 May 2023 (Morning)
09.00 – 09.35	**Lecture 6** **Steffen WEIDNER** *Bundesanstalt für Materialforschung und -prüfung, Berlin, Deutschland*
09.35 – 10.10	**Lecture 7** **Burkhard KÖNIG** *Institut für Organische Chemie, Universität von Regensburg, Deutschland*
10.15 – 11.00	**Poster Session 2 (P 34 - P 66) Alphabetical Order**
11.00 - 12.45	**Oral Communications - Session 4 : OC 17 - OC 23**
13.00	***Lunch***

	Friday 12 May 2023 (Afternoon)
15.00 – 16.30	**Table Ronde Publique en Partenariat avec la Fédération Nationale de la Chimie, UTICA** (Union Tunisienne de l'Industrie, du Commerce et de l'Artisanat)
16.30 – 17.30	**Coffee Break + Poster Session 2 (P 34 - P 66) Alphabetical Order**
19.30	***Dinner***
	Saturday 13 May 2023 (Morning)
09.00 – 09.35	**Plenary Lecture 8 Cédric FISCHMEISTER** *UR1 - UFR Sciences et Propriétés de la Matière, Université de Rennes 1, France*
09.45 - 10.45	**Oral Communications - Session 5 : OC 24 - OC 27**
10.45 – 11.30	**Poster Session 3 (P 67 - P 100) Alphabetical Order**
11.30 - 12.30	**Oral Communications - Session 6 : OC 28 - OC 31**
13.00	***Lunch***
	Saturday 13 May 2023 (Afternoon)
15.00 – 15.40	**Plenary Lecture 9 Jean-Yves WINUM** - Introduced by *Hichem Ben Jannet* *Université de Montpellier, Institut des Biomolécules Max Mousseron, France*
15.45 - 16.45	**Oral Communications - Session 7 : OC32 - OC 35**
17.00 – 17.45	**Coffee Break + Poster Session 3 (P 67 - P 100) Alphabetical Order**
19.30	***Dinner***
	Sunday 14 May 2023
09.00 – 09.35	**Plenary Lecture 10 Saber CHATTI** - Introduced by *Mehrez Romdhane* *Institut National de Recherche et d'Analyse Physico-Chimique - INRAP, Sidi Thabet, Tunisie*
09.45 - 11.45	**Oral Communications - Session 8 : OC 36 - OC 43**
12.00	**Closing Remarks and Poster Awards**
13.00	***Lunch, Check Out and Departure***

FOREWORD

The Tunisian Chemical Society is organizing a joint conference - OCC & SEPM 2023 - which will join the 8th Organic Chemistry Conference (OCC) and the 4th Science and Engineering of Polymeric Materials (SEPM) from 10 to 14 May 2023 in Yasmine Hammamet, in Tunisia. So, on behalf of the OCC & SEPM 2023 organizing committee, we are very pleased to welcome you to this event. The conference aims to connect young researchers with experienced chemists who will present new methods, technologies, and results. Attendees, including teachers, researchers, and industrial professionals, can share their knowledge, network with laboratory leaders, broaden their knowledge in chemistry, and stay up-to-date with the latest developments in their fields.

Our conference will feature ten notable speakers from various countries, who have agreed to contribute to our program. We aim to provide young researchers with an enjoyable yet educational experience that combines science and pleasure. In the past, both OCC and SEPM have approximately around 220 attendees each, who were chemistry enthusiasts. This year, we will be almost 215 scientists together and the program will be filled with 75 oral and 100 poster presentations on various topics in organic and polymers' chemistry.

We extend our best wishes to all attendees for a productive scientific meeting and a pleasant stay in Yasmine Hammamet, a beautiful tourist destination all year round.

Prof. Mohamed Lotfi EFRIT
President of the
Tunisian Chemical Society
and chair of the 8th OCC

Prof. Hatem BEN ROMDHANE
Chair of the 4th SEPM

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ABDELKAFI Med Mouldi	*FST, University of Tunis El Manar, Tunisia*

Wednesday 10 May 2023

14.00 - 17.00	**Welcoming participants, distribution of documents and check in**
17.00 – 17.30	**Opening Ceremony**
17.45 – 18.20	**Lecture 1** **David MECERREYES** - Introduced by *Hatem Ben Romdhane* *POLYMAT University of the Basque Country, Donostia-San Sebastian, Spain* Innovative Polymers for Next-Generation Batteries
18.20 – 18.55	**Lecture 2** **Pierre H. DIXNEUF** - Introduced by *Mohamed Lotfi Efrit* *University of Rennes, Institut des sciences chimiques, France* Catalysis: A key to prepare polypyridines, fused heterocycles, functional phosphines and to improve catalyst
19.30	***Dinner***

Thursday 11 May 2023 (Morning)

09.00 – 09.35	**Lecture 3** **Adel NEFZI** - Introduced by *Ridha Ben Salem* *Florida International University. Center of Translational Sciences, Florida, USA* Natural product-inspired synthetic libraries and diversity-oriented synthesis to accelerate drug discovery
09.35 – 10.10	**Lecture 4** **Amitav SANYAL** - Introduced by *Latifa Latrous* *Bogazici University, Istanbul, Turkey* Stimuli-Responsive Polymers: Tailoring Materials for Biomedical Applications
10.10 – 10.25	**Intervention** **CHUWAH Clifford Darah** - Senior Editor / Middle East and Africa - Springer Chemistry Africa: An opportunity for Chemical Sciences in Africa
10.25 – 10.35	**Gathering for the group photo**
10.35 – 11.15	**Poster Session 1 (P 1 - P 33) Alphabetical Order** **Evaluators:** Ayhan Oral, Gülen Türker

Oral Communications - Session 1

	Room A - Chair: *Taïcir Ben Ayed* ***Organic***		***Room B -*** Chair: *Mohamed M. Chehimi* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
11.15 – 11.30	**OC-01A**		**OC-01B**	**ABDELLAOUI Aida** - Isothermal sorption of pharmaceutical product into luffa activated carbon
11.30 – 11.45	**OC-02A**		**OC-02B**	**ACHECH Amel** - Synthesis and characterization of ZIF-8 Hybrid thin film deposed on glass substrate
11.45 – 12.00	**OC-03A**	**ARGOUBI Samar** - Exploring optimal routes for the synthesis of new highly fluorinated β-diphosphoramidates	**OC-03B**	**AKACHA Rania** - C-substituted poly(1,2,3-triazolium)s obtained through metal free AA+BB polyaddition of activated dialkynes
12.00 – 12.15	**OC-04A**	**ASSEL Amine** - Design and synthesis of novel sulfamate linked 4-hydroxycoumarin hybrids biological and computational insights into the anti-α-amylase potential	**OC-04B**	**ALKSKAS Ismail A.** - Thermotropic liquid crystalline poly(arylidene-ether)s
12.15 – 12.30	**OC-05A**	**BEN FATMA Nour El Houda** - In-silico study of ellagic acid	**OC-05B**	**BAACHAOUI Sabrine** - CB-doped Laser-induced graphene electrodes scribed on polyethersulfone membranes for flexible high-performance microsupercapacitors
12.30 – 12.45	**OC-06A**	**AHMAID Abdussalam** - Study of Optical and Electro Properties of Bulk Hetero junction of Organic Solar Cells with Varying of active Layer Thickness by Simulation models	**OC-06B**	**ABDEEWI Asmaa** - Surface properties evaluation of CAD/CAM PMMA denture compared to compressed molded PMMA: In vitro study
13.00	***Lunch***			

Thursday 11 May 2023 (Afternoon)

15.00 – 15.35	**Lecture 5** **Jean-Charles MAJESTE** - Introduced by *Hatem Majdoub* *Ingénierie des matériaux Polymères, Université Jean Monnet, Saint-Etienne, France* Rheology of polymer systems with dynamic interactions			
Oral Communications - Session 2				
	Room A - Chair: *Rym Abidi* ***Organic***		***Room B -*** Chair: *Halim Hammi* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
15.45 – 16.00	**OC-07A**	**BHAKTA Arvind Kumar** - Biochar: "new black gold" for environmental chemistry and sustainable future	**OC-07B**	**BEN ABDELKADER Maroua** - Application of an experimental design methodology for the optimization of cosmetotextile impregnation process by beta-cyclodextrin based microcapsules
16.00 – 16.15	**OC-08A**	**BOULILA Besma** - Design and semi-synthesis of novel triterpenic acids and fluoroquinolones hybrids as potential antibacterial agents	**OC-08B**	**BEN AMMAR Nour Elhouda** - Extraction of cellulose from the Alfa fiber in order to be introduced as an enforcement in a polymeric matrix. Optimization of the extraction by the methodology of design experiments.
16.15 – 16.30	**OC-09A**	**BOUZAYANI Bilel** - Synthesis and antioxidant assessment of some derived compounds from 2-amino-3-cyanothiophene	**OC-09B**	**BHIRI Fatma** - A new turn-on fluorescence sensor based on carbazole chromophore unit for the selective detection of Al^{3+}
16.30 – 16.45	**OC-10A**	**CHEHAIBI Mayssa** - Eco-friendly and efficient catalytic acylation of arenes with aromatic acyl chlorides, catalysed with iron (III) chloride under relatively mild conditions	**OC-10B**	
16.45 – 17.00	**OC-11A**	**CHERBIB Siwar** - Synthesis of biosourced polymers for removal of aromatic pollutants and polyphenols from margins	**OC-11B**	**ELOUSSIFI Hichem** - Kinetic and thermodynamic analyses for pyrolysis of some cellulosic herbaceous biomasses
17.00 – 17.45	**Coffee Break + Poster Session 1 (P 1 - P 33) Alphabetical Order** **Evaluators:** Ayhan Oral, Gülen Türker			
Oral Communications - Session 3				
	Room A - Chair: *Taieb Ben Dhia* ***Organic***		***Room B -*** Chair: *Mohamed Dammak* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
17.45 – 18.00	**OC-12A**		**OC-12B**	**EZZEDDINE Rahma** - PC/ABS/PMMA blends optimization via mixture design
18.00 – 18.15	**OC-13A**	**FERCHICHI Imen** - Synthesis of new phosphorylated heterocyclic compounds via 1,3-dipolar cycloaddition reactions	**OC-13B**	**FTITI Sondes** - Preparation and characterization of poly(lactic acid)- calcium phosphate composites for 3D-printing
18.15 – 18.30	**OC-14A**	**GAMOUDI Safa** - Intercalation of metformin hydrochloride into organosmectite: Excipient application.	**OC-14B**	**GHANMI Imen** - Optimization and comparaison study of adsorption and photosorption processes of mesoporous nano-TiO2 during discoloration of Indigo Carmine dye
18.30 – 18.45	**OC-15A**	**GANNOUNI Afef** - X-ray crystallography, spectral analysis, DFT studies, and molecular docking of (C9H15N3)[CdCl4] hybrid material against methicillin-resistant staphylococcus aureus (MRSA)	**OC-15B**	**MANNAI** Faten - Composite films based on mucilage from Opuntia ficus-indica (Cactaceae)
18.45 – 19.00	**OC-16A**	**GIRMA Wubshet Mekonnen** - Rapid synthesis of ternary heteroatom-doped carbon quantum dots under microwave irradiation and their biomedical application	**OC-16B**	**JAMHOUR Hana** - Effect of nano particle size and concentration of recycled acid resistant brick powder on shore hardness of linear low density polyethylene thermoplastic composites
19.30	***Dinner***			

Friday 12 May 2023 (Morning)

09.00 – 09.35	**Lecture 6** **Steffen WEIDNER** - Introduced by *Houcine Ammar* *Bundesanstalt für Materialforschung und -prüfung, Berlin, Deutschland* MALDI -TOF mass spectrometry – A versatile tool for polymer analysis
09.35 – 10.10	**Lecture 7** **Burkhard KÖNIG** - Introduced by *Farhat Rezgui* *Institut für Organische Chemie, Universität von Regensburg, Deutschland* Organic Synthesis with Visible Light
10.15 – 11.00	**Poster Session 2 (P 34 - P 66) Alphabetical Order** **Evaluators:** Hussein Etmimi, Anour Shebani

Oral Communications - Session 4

	Room A* - Chair:** *Jamil Kraiem* ***Organic		***Room B* - Chair:** *Nizar Bellakhal* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
11.00 – 11.15	**OC-17A**	**HASSINE Khaoula** - Evaluating the antidiabetic activity of a novel chitosan functionalized through triazoles and carbazoles	**OC-17B**	**MECHI Nabawia** - Use of Tunisian phosphogypsum to produce reinforced plaster
11.15 – 11.30	**OC-18A**		**OC-18B**	**MECHICHI Rania** - Adsorption of water pollutants using polyethersulfone modified silica gel
11.30 – 11.45	**OC-19A**	**JELALI Hamida** - Synthesis and characterization of 3-methylene isoindolinones by two synthetic routes	**OC-19B**	**MNAFKI Rim** - Posidonia Oceanica balls: Chemical composition
11.45 – 12.00	**OC-20A**	**JENDOUBI Abir** - A DFT study on the chemical fixation of CO_2 with aziridine catalyzed by NaBr salt: Solvent effects on activation barriers	**OC-20B**	**MZOUGHI Zeineb** - Comparative study of microwave-assisted and traditional extractions of polysaccharides from Swiss chard: Structural characterizations and hepatoprotective potentials evaluation
12.00 – 12.15	**OC-21A**	**KARAFI Athar** - Structural and spectral properties of new hybrids based on coumarin moieties and clay materials	**OC-21B**	**ORAL Ayhan** - Development of melatonin embedded PLGA-PEG6000 nanofiber biomaterial, and investigation of the effects on abdominal adhesion formation
12.15 – 12.30	**OC-22A**		**OC-22B**	**SEBAI Marwa** - New impedancemetric biosensors for rare earth element detection
12.30 – 12.45	**OC-23A**		**OC-23B**	**KARA Gheffar** - Influence of in-situ metallization process with three amounts of Pt NPs on structural virtues and mechanical behaviors of the surfaces of the polyacrylonitrile nanofibers
13.00	***Lunch***			

Friday 12 May 2023 (Afternoon)

15.00 – 16.30	**Table Ronde Publique en Partenariat avec la Fédération Nationale de la Chimie, UTICA** (Union Tunisienne de l'Industrie, du Commerce et de l'Artisanat) Modérateur: Mohamed Jaziri ***Thème*** Collaboration Structures de Recherche Universitaires / Entreprises Industrielles relevant de la Chimie : Enjeux et Expectatives
16.30 – 17.30	**Coffee Break + Poster Session 2 (P 34 - P 66) Alphabetical Order** **Evaluators:** Hussein Etmimi, Anour shebani
19.30	***Dinner***

Saturday 13 May 2023 (Morning)				
09.00 – 09.35	**Plenary Lecture 8** **Cédric FISCHMEISTER** - Introduced by *Adel Megriche* *UR1 - UFR Sciences et Propriétés de la Matière, Université de Rennes 1, France* Homogeneous catalysis for the transformation and valorisation of biosourced compounds			
Oral Communications - Session 5				
	Room A - Chair: *Azaiez Ben Akacha* ***Organic***		***Room B -*** Chair: *Latifa Bergaoui* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
09.45 – 10.00	**OC-24A**	**LAHMADI Ghofrane** - Novel oleanolic acid-isoindolinones bearing 1,2,3-triazole moieties as potential antibacterial agents: Design and synthesis	**OC-24B**	**BAATOUT Khouloud** - Highly selective turn-on florescent chemosensor for the detection of Cr (III) ion in drinking water
10.00 – 10.15	**OC-25A**	**MNASRI Aziza** - Synthesis of N -Heterocyclic carbene-palladium-PEPPSI complexes and their catalytic activity in the direct C-H bond activation	**OC-25B**	**BELAIDI Amal** - Gamma ray irradiation induced variations in structural and electrical properties of PVP neutral polymer in water
10.15 – 10.30	**OC-26A**	**MOUHIB Ayoub** - Synthesis, spectroscopic characterization and antioxidant evaluation of novel trisubstituted cyclohexenones	**OC-26B**	**GHARBI Samar** - A new truxene-based triazole-linked porous polymer for efficient removal of dyes from water by a synergistic adsorption/photodegradation approach
10.30 – 10.45	**OC-27A**	**NEJJARI Rida** - Semisynthesis and spectroscopic characterization of new isoxazolic heterocycles based atlantones isolated from Cedrus atlantica essential oil	**OC-27B**	**HADRICH Eya** - Development of selective extraction process of hydroxytyrosol from olive tree by-products
10.45 – 11.30	**Poster Session 3 (P 67 - P 99) Alphabetical Order** **Evaluators:** Nejib Mekni, Saber Chatti			
Oral Communications - Session 6				
	Room A - Chair: *Younes Moussaoui* ***Organic***		***Room B -*** Chair: *Houcine Naili* ***Polymer***	
	Com.	*Communicating*	*Com.*	*Communicating*
11.30 – 11.45	**OC-28A**	**ORAL Ayhan** - Mirabegron loaded transdermal patch for over active bladder	**OC-28B**	**KADRI Lina** - Random polydepsipeptides based on Phenylalanine and ε-caprolactone by direct melt copolymerization
11.45 – 12.00	**OC-29A**	**OUNI Sarra** - Exploring regioselective 1,3 dipolar cycloaddition in the vinyl-triazole series: A straightforward approach to bis-heterocycles	**OC-29B**	**MOUALHI Amir** - Toward sustainable phenolic resins from biobased aldehydes using spark plasma sintering
12.00 – 12.15	**OC-30A**	**SFAR Manel** - Hepatoprotective effect against cadmium-induced liver toxicity in rats of Foeniculum vulgare seed polysaccharides	**OC-30B**	
12.15 – 12.30	**OC-31A**	**TKA Najeh** - New 2,4-bis(arylethynyl)-9-chloro-5,6,7,8-tetrahydroacridines, synthesis and photo-physical properties investigation	**OC-31B**	
13.00	***Lunch***			

Saturday 13 May 2023 (Afternoon)		
15.00 – 15.40	**Plenary Lecture 9** **Jean-Yves WINUM** - Introduced by *Hichem Ben Jannet* *Université de Montpellier, Institut des Biomolécules Max Mousseron, France* Innovative approach targeting carbonic anhydrases: Boron-containing Inhibitors	
Oral Communications - Session 7		
	Room A – Chair : *Béchir Chaouachi* ***Organic***	
	Com.	*Communicating*
15.45 – 16.00	**OC-32A**	**TOUJ Nedra** - Synthesis and catalytic hydrogenation activity of ruthenium-arene complexes featuring aldiminium and 1,2,3-triazolium dithiocarboxylate zwitterions
16.00 – 16.15	**OC-33A**	**ZRAFI Sirine** - Amidation of carboxylic acids with amines in heterogeneous phase
16.15 – 16.30	**OC-34A**	**ARFAOUI Oumayma** - Chemical and Fatty Acid Composition of Crude and Purified Extracts Obtained from Datura innoxia Seeds Extracted with Different Solvents
16.30 – 16.45	**OC-35A**	**OUADDI Ayoub** - Design and hemisynthesis of new eugenol derivatives and evaluation of their biological properties
17.00 – 17.45	**Coffee Break + Poster Session 3 (P 67 - P 99) Alphabetical Order** **Evaluators:** Nejib Mekni, Saber Chatti	
19.30	***Dinner***	

Sunday 14 May 2023		
09.00 – 09.35	**Plenary Lecture 10** **Saber CHATTI** - Introduced by *Mehrez Romdhane* *Institut National de Recherche et d'Analyse Physico-Chimique - INRAP, Sidi Thabet, Tunisie* Design of green phases for water depollution by a combination of lignin and functional biopolymers	
Oral Communications - Session 8		
	Room A - Chair: *Majed Kammoun* ***Organic***	
	Com.	*Communicating*
09.45 – 10.00	**OC-36A**	**ARGUI Hayfa** - Biological activities of essential oils of Eucalyptus camaldulensis, in combination with the essential oils of Cupressus sempervirens
10.00 – 10.15	**OC-37A**	**CHEMINGUI Hajer** - Green synthesis of copper oxide nanoparticles (CuO NPs) from salvia officinalis leaf extract: Removal of Rhodamine B and Box-Behnken design
10.15 – 10.30	**OC-38A**	**FKIRI Anis** - Polyol synthesis of copper-doped ZnO nanorods for photocatalytic degradation of Diuron herbicide under simulated solar light.
10.30 – 10.45	**OC-39A**	**GRITLI Imene** - A facile approach for the synthesis of hematite and magnetite nanoparticles using starch for the removal of methylene blue from aqueous solution
10.45 – 11.00	**OC-40A**	**UMEREWENEZA Daniel** - Bioactive secondary metabolites from Rwandese medicinal plants
11.00 – 11.15	**OC-41A**	**ESSID Marwa** - Crystal Structure, thermal study, vibrational and optical properties of a novel dinuclear Bismuth(III) Iodide trimethylenedipyridine compound
11.15 – 11.30	**OC-42A**	**KAMOUN Madiha** - Microwave assisted solvent free reactions of glycerol and ethylene glycol with benzaldehyde under heterogeneous catalysis: mechanistic study
11.30 – 11.45	**OC-43A**	
12.00	**Closing Remarks and Poster Awards**	
13.00	***Lunch, Check Out and Departure***	

Speakers’ Abstracts

David MECERREYES

Ikerbasque Research Professor at POLYMAT University of the Basque Country (UPV/EHU)
Donostia-San Sebastian
Spain

Biography: PhD in polymer chemistry by the University of Liege (Belgium) in 1998. Then he carried out a post-doctoral stay at IBM Almaden Research Center and Stanford University in California. Back to Spain he worked for 10 years in CIDETEC. In 2011 he became Ikerbasque Research Professor at POLYMAT (www.polymat.eu), University of the Basque Country. Since then he coordinates the Innovative Polymers Group and acts as scientific vice-director of POLYMAT. His actual research interests include the synthesis of innovative polymers for energy and bioelectronics. In particular his team is dedicated to polymer chemistry of innovative redox polymers, poly(ionic liquid)s, iongels and conducting polymers. He is co-author of more than 350 scientific articles. Co-founder of the start-up company POLYKEY.

https://scholar.google.com.au/citations?user=XuMgA_UAAAAJ&hl=es
http://www.polymat.eu/en/groups/innovative-polymers-group
https://polykey.eu

Innovative Polymers for Next-Generation Batteries

David Mecerreyes

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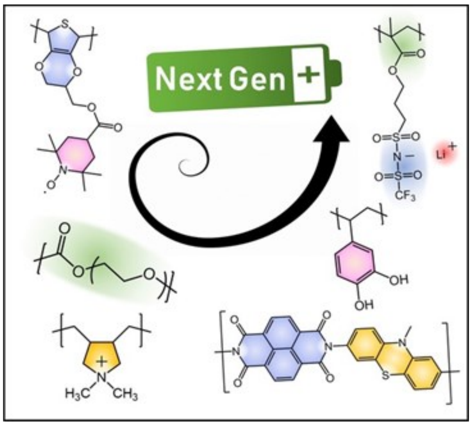
Lithium ion batteries are part of our modern life being present in daily used objects such as mobile phones, tablets, computers, watches, sport accessories, electric scooters or cars. The next generation batteries would need the development of innovative polymers that help to improve their performance in terms of power density, cyclability, raw materials availability, low weight, printability, flexibility, sustainability or security. In this presentation we will review our recent developments in the area of redox polymers and ionic conducting polymer electrolytes.[1-3] This includes the development of innovative binders for electrodes, polymer electrolytes and redox polymer nanoparticles. All these new polymer developments are leading to new battery technologies such as metal-polymer batteries (Li, Na), organic batteries, polymer-air and organic redox-flow batteries which are expected to complement in the future the actual commercial batteries.



Keywords: ionic polymers, polymer electrolytes, redox polymers, batteries

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References

[1] D. Mecerreyes, N. Casado, I. Villaluenga, M. Forsyth *Macromolecules* **2023**, in press.
[2] X. Wang, R. Kerr, F. Chen, N. Goujon, J.M. Pringle, D. Mecerreyes, M. Forsyth, P.C. Howlett, *Advanced Materials* 2020,32, 18, 1905219 https://doi.org/10.1002/adma.201905219
[3] N. Goujon, N. Casado, N. Patil, R. Marcilla, D. Mecerreyes, Progress in Polymer Science **2021**, 122, 101449 https://doi.org/10.1016/j.progpolymsci.2021.101449

Pierre H. DIXNEUF

Pierre H. Dixneuf,

Emeritus Research Professor

University of Rennes, France

Pierre H. Dixneuf, initially worked with Prof René Dabard on ferrocene chemistry for PhD and Dr es Science and with Prof. Michael F. Lappert on N-Heterocyclic Carbene (NHC)-Metal complexes. Professor of organometallic chemistry at the University of Rennes since 1978, he developed Catalysis since 1985 on catalytic processes promoted first with ruthenium catalysts and then initiated a CNRS Rennes-Catalysis center.

He successively developed selective catalytic transformations of alkynes, incorporation of CO_2, ruthenium-vinylidenes and -allenylidenes in catalysis, enantioselective hydrogenation for industry with chiral Ru catalysts, new alkene metathesis catalysts for the transformation of plant oil derivatives. He is now contributing since 2007 to C–H bond activation/functionalization using Ru(II) and Rh(I) catalysts.

He has co-authored 480 publications and reviews, 32 from 2017, and co-edited 7 books. He received international prizes from Germany, Italy, Spain, Portugal, China, India, and académie des sciences IFP grand Prix.

He founded the CNRS-UR1 research Institut de chimie de Rennes in 2000 and was university vice-president for research (2001-2004) after his work as Scientific Deputy Director of CNRS Chemistry in Paris (1996-1999).

Catalysis : A key to Prepare Polypyridines, Fused Heterocycles, Functional Phosphines And to improve catalysts

Pierre H. Dixneuf

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key words : C-H bond functionalization, polypyridines, fused heterocycles, functional phosphines, improvement of Ru and Rh catalysts

Pyridines in metal complexes are key ligands to promote selective catalytic reactions, and as photocatalysts such as $\{Ru(bipy)_3]^{2+}\}$[1]. Phosphine ligands, can control the activity of molecular metal catalysts for numerous useful catalytic reactions used in industry.

Fast modifications of these P[2] and N ligands via C-H bond functionalization[3] have potential to quickly create more efficient catalysts for useful transformations and applications.

The lecture will present several aspects of functionalization of pyridines, N-heterocycles and phosphines from C-H bond functionalizations and improvement of Phosphine-Metal catalysts obtained during the last 4 years.

i) Pyridines

- Ruthenium(II) catalysts in water solvent without surfactant can promote sp^{2}C-H bond activation and can be directed to produce polyheterocycles and hexapyridine compounds and hexa(heteroaryl)benzenes leading to simple Ru(II) or Pd(II) complexes and catalysts[4].
- Ruthenium(II) catalysts can be driven for partial reduction of N-Heteroarenes for tandem functionalization via diastereoselective Annulation of Azaarenes into Fused Nheterocycles[5].

ii) Phosphines

- Ruthenium(II)-catalyzed selective sp^{2}C-H bond alkylations with alkenes of arylphosphine oxides can be controlled to give access to bifunctional phosphines with carboxylic group[6].
- Rhodium(I) catalysts promote the regioselective mono or dialkylation and dialkenylation of the biaryl ortho'C-H bonds of phosphines to produce functional dialkylated phosphines even with long chain[7]; or bulky dialkenylphosphines[8]

Examples of increased activity of catalysts using modified phosphines will be presented for carboxylation with CO_2 of arylhalides or for C-N bond cross couplings[7,8]

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Adel NEFZI

Dr. Nefzi obtained his Ph.D. in Chemistry in 1995 from the University of Lausanne in Switzerland. He is currently a research Professor at the Center for Translational Science, Florida International University (FIU). Before joining FIU, he worked as an associate member and director of the chemistry department at Torrey Pines Institute for Molecular Studies (TPIMS) in Port Saint Lucie, Florida. Dr. Nefzi research is focused on the design and the synthesis of small molecules and heterocyclic combinatorial libraries and their application in drug discovery. He has more than 136 publications in many outstanding journals, numerous lectures at scientific symposia and ten issued US patents. Dr. Nefzi research is supported by National Institute of health (NIH), National Science Foundation (NSF) and Department of Defense (DOD).

Dr. Nefzi is a member of American Chemical Society, member of American Peptide Society, member of American Association of Pharmaceutical Scientists and member of Fluorine Chemistry Society, and executive member of the Society for the Advancement of Science and Technology in the Arab World (SASTA).

Natural Product-Inspired Synthetic Libraries & Diversity-Oriented Synthesis to Accelerate Drug Discovery

Dr. Adel Nefzi

Center for Translational Science, Florida International University, USA

The last two decades has witnessed major breakthroughs in the identification of genes, gene products, metabolic pathways, and signaling pathways, as well as progress in miniaturization and robotics, enabling the development of high-throughput mechanism-based biological assays. One of the central objectives of organic and medicinal chemistry is the design, synthesis, and production of molecules having value as human therapeutic agents. Our research group is interested in the design, synthesis, analysis, conformations, dynamics and structure-biological activity relationships of diverse peptides, peptidomimetics and nitrogen heterocycles of different ring sizes. Small molecule diaza- and triaza-cyclic compounds with different substitution patterns and embedded in various molecular frameworks constitute important structure classes in the search for bioactivity. The compounds are designed to follow known drug-likeness rules including “Lipinski’s Rule of Five”. Early work from our laboratory has shown the utility of our chemical libraries for the de novo identification of highly active antimicrobial compounds, antimalarials, potent analgesics, antifibrotic compounds, and novel antitumor agents. Examples of the synthesis of heterocyclic peptidomimetic librarie and the application of combinatorial chemistry for the identifiaction of highly active compounds will be presented.

Key words: combinatorial chemistry, drug discovery, heterocyclic compounds, solid phase organic synthesis.

Amitav
SANYAL

Amitav Sanyal obtained his undergraduate degree from the Indian Institute of Technology at Kanpur, India. He received his Ph.D. from Boston University, USA, in the area of asymmetric synthesis. During post-doctoral work with Prof. Vincent M. Rotello at University of Massachusetts at Amherst, USA, he worked in the area of polymeric coatings. Currently, he is a professor in the Department of Chemistry at Bogazici University, Istanbul, Turkey. His research focuses on the design of novel polymeric coatings, hydrogels and nanofibers for biomedical applications, and has published over 100 articles in these areas. His awards include the Young Investigator award from The Turkish Academy of Sciences and from The Scientific and Technological Research Council of Turkey. He serves on the editorial board of Polymer Chemistry, European Polymer Journal, Bioconjugate Chemistry, Biomacromolecules and Molecules (Nanomaterials), and is an Associate Editor of Journal of Macromolecular Science, Part A: Pure & Applied Chemistry.

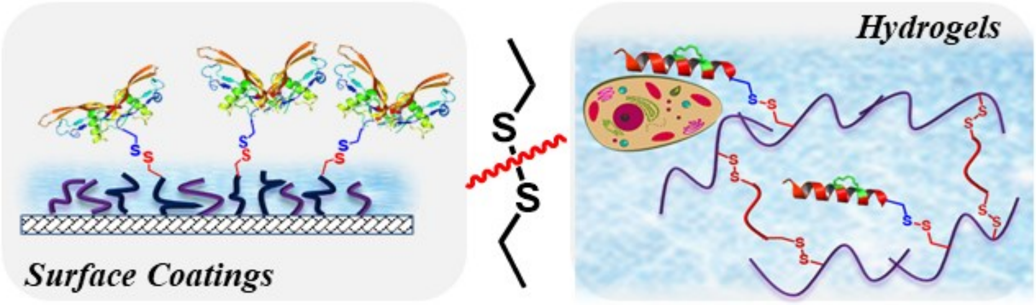
Further details about research activities/publications can be found at https://sanyalgroup.boun.edu.tr/

Stimuli-Responsive Polymers:
Tailoring Materials for Biomedical Applications

Amitav Sanyal

Department of Chemistry, Bogazici University, Bebek, 34342, Istanbul, Turkey
Center for Life Sciences and Technologies, Bogazici University, Istanbul, Turkey

Stimuli-responsive polymeric materials such as functional coatings, nanogels, hydrogels, and nanofibers that are amenable to facile multi-functionalization with bio-recognition, imaging, therapeutic, and targeting agents are attractive platforms for various biomedical applications. The talk will report our approaches toward the fabrication of novel redox-responsive polymeric materials such as surface coatings, and hydrogels that can catch-and-release a target analyte or facilitate delivery of a therapeutic agent in a stimuli-responsive manner [1-4]. In particular, I will highlight the utilization of simple yet powerful thiol-disulfide exchange based transformations to tailor polymeric materials for target applications.



Key words: Stimuli-Responsive Polymers, Hydrogels, Surface Coating, Biofunctionalization.

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Jean-Charles MAJESTÉ

Pr. Jean-Charles Majesté studied polymer science at the University of Pau and Bordeaux (France). He received his PhD in polymer physics in 1998 on the subject of molecular dynamics of polymers with very broad molar mass distributions. Then, he joined the EXXON Chemical Europe group for one year post-doctoral position to work on branched polyolefins. In 1999, he joined the IMP laboratory (Ingénierie des Matériaux Polymères, UMR CNRS 5223) where he is currently a full professor, head of the laboratory in Saint-Etienne and leads the team "Structure and Rheology of polymers: processes and modeling". His research activities, in close collaboration with the polymer industry, focus on the relationships between the structure, morphology and rheological properties of polymer systems in the melt state, elastomers and colloïdal systems. He is particularly interested in modeling viscoelastic behavior for applications in polymer processing and in understanding the flow of complex materials. He is a member of the French Rheology Group.

Rheology of polymer systems with dynamic interactions

Jean-Charles Majesté

Ingénierie des Matériaux Polymères, UMR CNRS 5223
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When non-covalent bonds exist in a polymeric system, new and diverse global properties emerge related to the dynamic nature of intra or inter-chain interactions. These bonds are mainly introduced by chemical modification on macromolecules with controlled architecture by supramolecular chemistry but can also exist natively as in the case of natural polymers (polysaccharides, proteins, ...). One of the most attractive and practical advantages of adding dynamic bonds is the reversibility and dynamic character of the induced polymeric structure which allows them to be the origin of adaptive materials that are smart, sensitive to stimuli, self-healing, opto-electronic, biocompatible, etc... Some of the interactions that can be found include hydrogen bonding, ionic bonding, metal ligand, host-guest, π-π.

Because it is able to detect molecular motions at any scale and over a wide temperature range, rheology provides powerful experimental and theoretical tools to study these dynamic systems and shed light on the underlying mechanisms.

We will present a series of studies on systems involving dynamic interactions of different nature (ionic, hydrogen, ...). We will expose the variety of rheological behaviors observed associated with the structure of the chains and the nature of the interactions. Thanks to all these examples, we will demonstrate the contribution of rheology to confirm the chemical mechanisms, to specify the particular molecular dynamics of these systems, to optimize their shaping and, in some cases, to model their dynamic association.

Key words: supramolecular chemistry, dynamic interactions, rheology, structure/properties relationships

Steffen WEIDNER

- born February 15, 1962
- married, 2 sons
- Berlin

1982-1987 Study of Chemistry at Humboldt-University of Berlin

1987-1989 Scientist at the German Academy of Science (Institute for Physical Chemistry)

After Germany's re-unification:

1990 scientist at the Federal Institute for Materials Research and Testing (BAM)

1992 – 1996 PhD at Technical University of Berlin (Phase behavior of cholesterol containing liquid crystalline side-chain methacrylates)

1999 head of polymer analysis group at BAM

- 170 scientific papers, 4 book chapters
- Special focus on mass spectrometric and chromatographic techniques for polymer characterization
- Organizer of the annual meeting "Mass spectrometry of synthetic polymers" (1997 - today)

MALDI -TOF mass spectrometry – A versatile tool for polymer analysis

Steffen M. Weidner and Jana Falkenhagen

Federal Institute for Materials Research and Testing – BAM, 6.3 Structure Analysis,
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Since its introduction in the 1990-ties Matrix-assisted Laser Desorption/Ionization Time-of-flight (MALDI TOF) mass spectrometry has become an indispensable tool for polymer analysis.[1] Apart from molecular masses and mass distributions, information about the polymer backbone, the composition of copolymers and structure of end groups can be obtained simultaneously. Due to its principle, some limitations have to be considered, like poor ionization of non-polar polymers and problems to characterize polymers with broad dispersities. Coupling to various chromatography modes (SEC, HPLC, “critical” chromatography) [2] offers the chance to overcome some of these problems. Examples will be presented, which include the analysis of (co-)polyesters with large dispersities, the determination of copolymer distributions, the control of polymerization and MS/MS fragmentation experiments.[3] Moreover, MALDI imaging experiments to determine segregation effects during sample spot preparation will be briefly discussed.[4]

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Burkhard KÖNIG

Burkhard König received his Ph.D. from the University of Hamburg, Germany and was a post-doctoral fellow with Prof. M. A. Bennett, Australian National University, Canberra, and Prof. B. M. Trost, Stanford University, U.S.A. Since 2000, he is a full professor of organic chemistry at the University of Regensburg, Germany. His research interests revolve around the use of visible light in organic synthesis as efficient and sustainable energy source.

Organic Synthesis with Visible Light

Burkhard König

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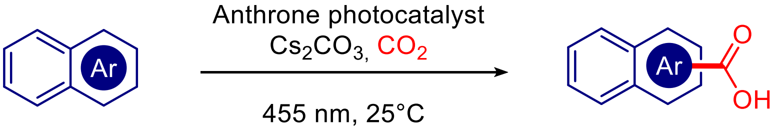
Ideal chemical transformations in terms of green and sustainable chemistry convert abundant, low energy starting materials into high value products without losing a single atom.[1] Light-driven catalysis offers tools for such reactions.[2] We discuss in the lecture key photocatalytic principles and how they can be applied to redox-neutral reactions, such as C-H carboxylations of alkanes and arenes with carbon dioxide.[3] Current scope and limitations are shown and a perspective is given where the use of light may lead to better catalysis.[4]



Redox-neutral photocatalytic C-H carboxylation

Key words: Photocatalysis, Carboxylation, C-H activation, redox-neutral reactions

Acknowledgements

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European Research Council
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Cédric FISCHMEISTER

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• Education

1994-1998	PhD in Chemistry *Hybrid materials, sol-gel process* University of Montpellier II, France. Prof. R. Corriu and Prof. G. Cerveau.
1998-1999	Post-doc 1, University of Rennes 1, France. Pr. R. Réau.
1999-2000	Post-doc 2, University of Cambridge, UK. Pr. A. B. Holmes.
Since 2001	CNRS research engineer at the Rennes Institute for Chemical Sciences
2008	Habilitation

• Current research interests

- Homogeneous Catalysis: hydrogenation, transfer hydrogenation, hydrogen storage, Olefin metathesis
- Organometallic Chemistry: New complexes and catalysts based on ruthenium, iridium, cobalt
- Green Chemistry, clean processes, greener reaction media, tandem reactions
- Transformation of renewable resources: Fatty esters, terpenes, carbohydrate based chemicals.

• Current Collaborations: M. Beller (Rostock, Germany), M. Rabiller Baudry (Rennes, France), A. Igau (Toulouse, France), E. dos Santos (Belo Horizonte, Brazil), D. Mandelli (Santo André, Brazil), M. L. Efrit (Tunisia).

• Publications: 103 publications, 6 reviews, 8 book chapters, 3 patents.

• Invited talks at international conferences:

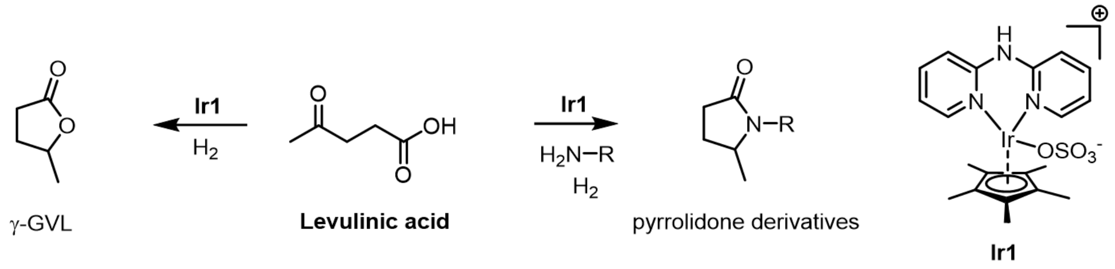
- 4th International Symposium on Green and Sustainable Chemistry, GSC 4, Beijing, August 20-24, 2009.
- 40th International Conference on Coordination Chemistry, ICCC 40, Valence, Spain, Sept. 9-13, 2012
- 96th Canadian Chemistry Conference, Quebec, Canada, 26-30 May 2013
- 2nd International Green Catalysis Conference, Rennes, France, 2-4 April 2014
- 19th Brazilian Meeting on Inorganic Chemistry, Fortaleza, Brazil, 24-28 September 201

Homogeneous catalysis for the transformation and valorisation of biosourced compounds

Cédric Fischmeister

Univ Rennes, CNRS, ISCR (Institut des Sciences Chimiques de Rennes) - UMR6226, 35000 Rennes, France

The use of biomass and bio-based compounds to replace materials of fossil origin is a topic of major importance because of the scarcity of these fossil resources and because it is imperative to reduce our CO_2 emissions. In this context, catalysis plays a crucial role as it enables efficient and selective chemical transformations while reducing energy consumption and waste production. We are interested in the transformation of biobased compounds by homogeneous catalysis, in particular by olefin metathesis reactions as well as by reduction processes. To carry out these transformations we use commercially available catalysts but also catalysts synthesized in the laboratory. Recent achievements in the transformation of terpenes and other naturally occurring unsaturated compounds using olefin metathesis will be presented.[1] In another area, the transformation of levulinic acid into g-valerolactone and pyrrolidone derivative will be discussed.[2]



Key words: Biosourced compounds, homogeneous catalysis, olefin metathesis, hydrogenation

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Jean-Yves WINUM

Jean-Yves Winum received his PhD in chemistry from the University of Montpellier (France) in 1998. He then worked as a postdoctoral fellow in the Chemistry department of Georgetown University (Washington, DC) and of the University of Geneva (Switzerland). In 1999, he joined the University of Montpellier, where he is now Full Professor. His research interests are focused on organic/medicinal chemistry of metalloenzyme inhibitors. He published more than 190 articles (h-index 46) in this field. He is ranked among the World’s top 2% most-cited scientists, since 2019. (Stanford University Ranking).

Innovative approach targeting carbonic anhydrases: Boron-containing Inhibitors

Jean-Yves Winum

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The zinc metalloenzymes carbonic anhydrases (CAs, EC 4.2.1.1) are considered as drug targets for several pathologies, and different inhibitors found clinical applications as diuretics, antiglaucoma agents, anticonvulsants, and anticancer agents/diagnostic tools. Their main drawback is related to the lack of isoform selectivity leading to serious side effects for all pathologies in which they are employed. Even if the potency of carbonic anhydrase inhibitors has been greatly improved in the last years, with inhibitors reaching inhibition constants in the femtomolar range, the selectivity issue remains important.

In this presentation, a recent approach to targeting carbonic anhydrases, initiated and developed in our laboratory, will be discussed. This new strategy dealing with boron-based small molecule inhibitors, may open new opportunities in the drug design of innovative isoform-selective carbonic anhydrase inhibitors with biomedical applications.

Keywords: benzoxaborole, carbonic anhydrase, inhibitors, synthesis, *in-silico* study, X-ray structural study.

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Saber CHATTI

Saber CHATTI received his PhD in December 2001 at the University Paris XI France under the supervision of Dr André Loupy.

He undertook 2 years of postdoctoral position at the University of Hamburg sponsored by the Alexander von Humboldt Foundation AvH Foundation in Bonn, Germany under the supervision of Prof. Hans Kricheldorf.

In 2004 he was appointed assistant professor at the National Institute of Research and Physical Analysis INRAP in Tunis and full professor in November 2013 at the same institution. Saber Chatti performed several collaborations, projects and research stays with young researchers and PhD students at:

- CNRS-University of Lyon 1 “Institute of Analytic Sciences ISA”, UMR 5280
- CNRS-University of Lyon 1 National Institute of Applied Sciences Lyon “Institute of Materials and Polymers IMP “UMR 5223
- Federal Institute for Materials Research and Testing (BAM) in Berlin, Germany
- University of Hamburg at the Institute of Macromolecular Chimie-Hamburg (TMC) Germany

In June 2012, he received a graduate fellowship for 6 years from the CNRS ISA, Lyon UMR 5280 in France.

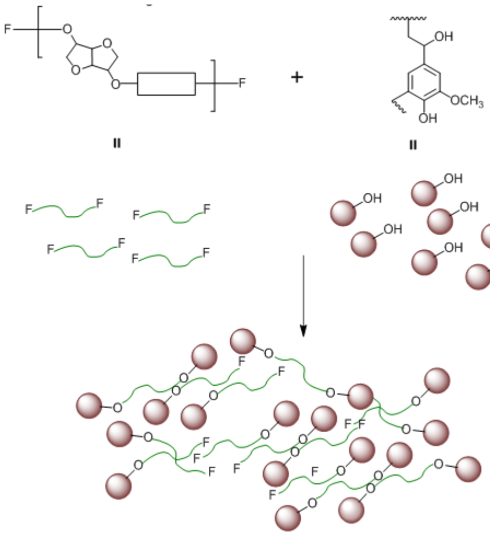
His researches interest the elaboration and characterization of new biomaterials useful for the extraction of large varieties of pollutants and heavy/rare metals in water and soil such as glyphosate, Atrazines, polyphenols, aliphatic acids, La, Ce, Hg, Cd, Ni.

Design of green phases for water depollution by a combination of lignin and functional biopolymers

Saber Chatti[1], Jana Falkenhagen[2], Klas Meyer[2], Catherine Marestin[3],
Nicole Jaffrezic-Renault[4], Steffen Weidner[2]

[1] National Institute of Research and Physicochemical Analysis Biotechnopole of Sidi Thabet, Tunisia
[2] Federal Institute of Material Research and Testing, BAM, Berlin, German
[3] Institute of Polymer Materials IMP-INSA, UMR 5223, University of Lyon, France
[4] Institute of Analytical Sciences, UMR 5280, University of Lyon, France

Lignin is a highly aromatic low value biomass residue, which can be utilized for chemicals, fuels and materials production. In recent years, significant attention has focused on adsorber materials based on lignin. The main objective of this project is to improve the adsorption capacity by chemical modification of lignin with bio-based linear difluoro oligomers.



Based in our previous works[1],[2], we functionalized the phenolic functional groups of a lignin with oligomers structures having function groups (SO2, -C-N, -P=O, -P=S) which can improve the wettability and the hydrophilicity of lignin. The resulting new adsorber phases were successfully characterized with different techniques. We have performed with selected phases various adsorption test efficiencies with heavy metals and PFAS compounds.

Key words: Lignin, isosorbide, polycondensation, depollution, PFAS compounds, heavy metals.

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List of Oral Communications

Nr	Authors, Institution and Title of Abstract	Ref
1	**A. Abdeewi**, A. Shebani, A. Quteshat *Libyan Polymer Research Center, Tripoli, Libya* Surface properties evaluation of CAD/CAM PMMA denture compared to compressed molded PMMA: in vitro study	**OC06B**
2	**A. Abdellaoui**, S. Jmai, S. Guiza, M. Bagane *ENIG - Gabès* Isothermal sorption of pharmaceutical product into luffa activated carbon	**OC01B**
3	**A. Achech**, A. Haj Said *FSM - Monastir* Synthesis and characterization of ZIF-8 hybrid thin film deposed on glass substrate	**OC02B**
4		
5		
6	**A. Ahmaid**, A.A. Jangher, A.A. Sghayer *The Libyan Academy, School of Basic Science, Tripoli, Libya* Study of optical and electro properties of bulk hetero junction of organic solar cells with varying of active layer thickness by simulation models	**OC06A**
7	**R. Akacha**, H. Ben Romdhane, E. Drockenmuller *FST - Tunis* C-substituted poly(1,2,3-triazolium)s obtained through metal free AA+BB polyaddition of activated dialkynes	**OC03B**
8	**I.A. Alkskas** *Misurata University - Libya* Thermotropic liquid crystalline poly(arylidene-ether)s	**OC04B**
9	**O. Arfaoui**, H. Sbihi *FSB - Bizerte* Chemical and fatty acid composition of crude and purified extracts obtained from *Datura innoxia* seeds extracted with different solvents	**OC34A**
10	**S. Argoubi**, M.A. Sanhoury, E. Manoury, I. Chehidi *FST - Tunis* Exploring optimal routes for the synthesis of new highly fluorinated β-diphosphoramidates	**OC03A**
11	**H. Argui**, O. Ben Youchret-Zallez, S. Can Suner, Ç. Deniz Periz, S. Ulusoy, M. Ben Attia, Y. Coşku, A. Oral, H. Said *FSB - Bizerte* Biological activities of essential oils of Eucalyptus camaldulensis, in combination with the essential oils of Cupressus sempervirens	**OC36A**

Nr	Authors, Institution and Title of Abstract	Ref
12	**A. Assel**, A. Hajlaoui, H. Lazrag, M. Manachou, A. Romdhane, J. Kraiem, H. Ben Jannet *FSM - Monastir* Design and synthesis of novel sulfamate linked 4-hydroxycoumarin hybrids Biological and computational insights into the anti-α-amylase potential	OC04A
13	**S. Baachaoui**, W. Mabrouk, A. Rabti, O. Ghodbane, N. Raouafi *FST - Tunis* CB-doped Laser-induced graphene electrodes scribed on polyethersulfone membranes for flexible high-performance microsupercapacitors	OC05B
14	**K. Baatout**, A. Jebnouni, S. Teka, Y. Bahrouni, N. Smida Jaballah, O. Bechambi, M. Majdoub *FSM - Monastir* Highly selective turn-on florescent chemosensor for the detection of Cr (III) ion in drinking water	OC24B
15	**A. Belaidi**, M. Guettari, T. Tajouri *IPEIT - Tunis* Gamma ray irradiation induced variations in structural and electrical properties of PVP neutral polymer in water	OC25B
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17	**N.E. Ben Ammar**, R. Gatri, H. Hamzaoui *CNRSM - Borj Cédria* Extraction of cellulose from the Alfa fiber in order to be introduced as an enforcement in a polymeric matrix. Optimization of the extraction by the methodology of design experiments.	OC08B
18	**N.E.H. Ben Fatma**, M. Laribi, K. Bellil, M.A. Soussi *Faculty of Pharmacy, Monastir* In-silico study of ellagic acid	OC05A
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20	**A.K. Bhakta**, M. El Garah, Y. Snoussi, M.M. Chehimi *Paris Cité University, Paris, France* Biochar: “new black gold” for environmental chemistry and sustainable future	OC07A
21	**F. Bhiri**, M. Chemli, N. Leclerc, M. Majdoub *FSM - Monastir* A new turn-on fluorescence sensor based on carbazole chromophore unit for the selective detection of Al^{3+}	OC09B
22	**B. Boulila**, H. Ben Jannet, A. Daich, M. Othman, A. Romdhane, A.M. Lawson *FSM - Monastir* Design and semi-synthesis of novel triterpenic acids and fluoroquinolones hybrids as potential antibacterial agents	OC08A

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24	**B. Bouzayani**, B. Bouzayani, M. Elakermi, M. Ben Mosbah, Y. Moussaoui, G. Rigane, R. Ben Salem *FSS - Sfax* Synthesis and antioxidant assessment of some derived compounds from 2-amino-3-cyanothiophene	**OC09A**
25	**M. Chehaibi**, J. Kraeim *FSM - Monastir* Eco-friendly and efficient catalytic acylation of arenes with aromatic acyl chlorides, catalysed with iron (III) chloride under relatively mild conditions	**OC10A**
26	**H. Chemingui**, T. Missaoui, T. Ben Amor, A. Hafiane *CERTE - Borj Cédria* Green synthesis of copper oxide nanoparticles (CuO NPs) from salvia officinalis leaf extract : Removal of Rhodamine B and Box-Behnken design	**OC37A**
27	**S. Cherbib**, H. Snani, R. Mercier, C. Marestin, S. Chatti, I. Jlalia *FSB - Bizerte* Synthesis of biosourced polymers for removal of aromatic pollutants and polyphenols from margins	**OC11A**
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29	**H. Eloussifi**, M. Dammak *FSS - Sfax* Kinetic and thermodynamic analyses for pyrolysis of some cellulosic herbaceous biomasses	**OC11B**
30	**M. Essid**, C. Hrizi, A. Khatyr, M. Knorr, A. Krupp, C. Strohmann, S. Ammar *FSG - Gabès* Crystal structure, thermal study, vibrational and optical properties of a novel dinuclear bismuth(III) Iodide trimethylenedipyridine compound	**OC41A**
31	**R. Ezzeddine**, K. Fehri, B. Samet *ENIS - Sfax* PC/ABS/PMMA blends optimization via mixture design	**OC12B**
32	**I. Ferchichi**, M.A. Sanhoury, N. Mekni *FST - Tunis* Synthesis of new phosphorylated heterocyclic compounds via 1,3-dipolar cycloaddition reactions	**OC13A**
33	**A. Fkiri** *FSB - Bizerte* Polyol synthesis of copper-doped ZnO nanorods for photocatalytic degradation of Diuron herbicide under simulated solar light.	**OC38A**

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34	**S. Ftiti**, A. Guidara, S.C. Cifuentes, H. Tounsi *ENIS - Sfax* Preparation and characterization of poly(lactic acid)- calcium phosphate composites for 3D-printing	OC13B
35	**S. Gamoudi**, S. Omrani, E. Srasra *ENIG - Gafsa* Intercalation of metformin hydrochloride into organosmectite: Excipient application	OC14A
36	**A. Gannouni**, R. Kefi *FSB - Bizerte* X-ray crystallography, spectral analysis, DFT studies, and molecular docking of $(C_9H_{15}N_3)[CdCl_4]$ hybrid material against methicillin-resistant staphylococcus aureus (MRSA)	OC15A
37	**I. Ghanmi**, W. Sassi, P. Oulego, S. Collado, A. Ghorbal, M. Díaz *ISSAT - Gabès* Optimization and comparison study of adsorption and photosorption processes of mesoporous nano-TiO2 during discoloration of Indigo Carmine dye	OC14B
38	**S. Gharbi**, N. Mendez, K. Hriz, M. Majdoub, B. Gómez-Lor *FSM - Monastir* A new truxene-based triazole-linked porous polymer for efficient removal of dyes from water by a synergistic adsorption/photodegradation approach	OC26B
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40	**I. Gritli**, A. Bardaoui, H. Chmingui, S. Ammar, R. Chtourou, A. Hafiane *CRTEn - Borj Cédria* A facile approach for the synthesis of hematite and magnetite nanoparticles using starch for the removal of methylene blue from aqueous solution	OC39A
41	**E. Hadrich**, H. Casabianca, N. Jaffrezic-Renault, C. Marestin, S. Chatti, H. Ben Romdhane *FST - Tunis* Development of selective extraction process of hydroxytyrosol from olive tree by-products	OC27B
42	**K. Hassine**, K. Hriz, H. Majdoub *FSM - Monastir* Evaluating the antidiabetic activity of a novel chitosan functionalized through triazoles and carbazoles	OC17A
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44	**H. Jamhour**, H. Etmimi, W. Alakrash, R. Elhabishi, O.I. Khmaji *Libyan Polymer Research Center, Tripoli, Libya* Effect of nano particle size and concentration of recycled acid resistant brick powder on shore hardness of linear low density polyethylene thermoplastic composites	**OC16B**
45	**H. Jelali**, L. Mansour, J. Al-Tamimi, E. Deniau, M. Sauthier, N. Hamdi *ISSTE - Borj Cédria* Synthesis and characterization of 3-methylene isoindolinones by two synthetic routes	**OC19A**
46	**A. Jendoubi**, M. Hochlaf, Y. Arfaoui *FST - Tunis* A DFT study on the chemical fixation of CO_2 with aziridine catalyzed by NaBr salt: Solvent effects on activation barriers	**OC20A**
47	**L. Kadri**, S. Salhi , C. Delaite, L.I. Atanase, A.S. Schuller, H. Ammar *FSS - Sfax* Random polydepsipeptides based on phenylalanine and ε-caprolactone by direct melt copolymerization	**OC28B**
48	**M. Kamoun**, R. Hayder, N. Besbes *FST - Tunis* Microwave assisted solvent free reactions of glycerol and ethylene glycol with benzaldehyde under Heterogeneous Catalysis: Mechanistic study	**OC42A**
49	**G. Kara**, M. Kehtari *Tishreen University, Latakia, Syria* Influence of in-situ metallization process with three amounts of Pt NPs on structural virtues and mechanical behaviors of the surfaces of the polyacrylonitrile nanofibers	**OC23B**
50	**A. Karafi**, B. Mellah *FSB - Bizerte* Structural and spectral properties of new hybrids based on coumarin moieties and clay materials	**OC21A**
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53	**G. Lahmadi**, A. Romdhane, A.M. Lawson, A. Daich, H. Ben Jannet, M. Othman *FSM - Monastir* Novel oleanolic acid-isoindolinones bearing 1,2,3-triazole moieties as potential antibacterial agents : Design and synthesis	**OC24A**
54	**F. Mannai**, M.N. Belgacemb, Y. Moussaoui *FSG - Gafsa* Composite films based on mucilage from Opuntia ficus-indica (Cactaceae)	**OC15B**

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56	**R. Mechichi**, S. Chatti, I. Jlalia, H. Casabianca, E. Vulliet, R. Mercier, S. Weidner, N. Jaffrezic-Renault, H. Abderrazak *INRAP - Sidi Thabet* Adsorption of water pollutants using polyethersulfone modified silica gel	OC18B
57	**R. Mnafki**, A. Morales, L. Sillero, R. Khiari, Y. Moussaoui, J. Labidi *FSG - Gafsa* Posidonia Oceanica balls: Chemical Composition	OC19B
58	**A. Mnasri**, I. Özdemir, N. Hamdi *FSG - Gafsa* Synthesis of N -heterocyclic carbene-palladium-PEPPSI complexes and their catalytic activity in the direct C-H bond activation	OC25A
59	**A. Moualhi**, A. Rios De Anda, H. Vahabi, S. Chatti, H. Abderrazak, E. Renard *INRAP-ICMPE-INSAT* Toward sustainable phenolic resins from biobased aldehydes using spark plasma sintering	OC29B
60	**A. Mouhib**, R. Nejjari, B. Es-Sounni, A. Mouzdahir, M. El Yazidi, A. Benharref, N. Mazoir, M. Bakhouch *Chouaib Doukkali University, Casa El Jadida, Morocco* Synthesis, spectroscopic characterization and antioxidant evaluation of novel trisubstituted cyclohexenones	OC26A
61	**Z. Mzoughi**, G. Souid, C. Rihouey, D. Le Cerf, H. Majdoub *FSM - Monastir* Comparative study of microwave-assisted and traditional extractions of polysaccharides from Swiss chard: Structural characterizations and hepatoprotective potentials evaluation	OC20B
62	**R. Nejjari**, H. Raji, T. Benali, A. Mouhib, A. Mouzdahir, A. Benharref, N. Mazoir, M. Bakhouch *Chouaib Doukkali University, Casa El Jadida, Morocco* Semisynthesis and spectroscopic characterization of new isoxazolic heterocycles based atlantones isolated from *Cedrus atlantica* essential oil	OC27A
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64	**A. Oral**, O. N. Gökçe, D. Aykora, M. Danışman, U. Demir, C. Aydeğer, S. C. Suner, İ. Karaboğa, M. Uzun *Canakkale Onsekiz Mart University, Türkiye* Development of melatonin embedded PLGA-PEG6000 nanofiber biomaterial, and investigation of the effects on abdominal adhesion formation	OC21B
65	**A. Oral** , S. Can Suner, E. B. Sancak *Canakkale Onsekiz Mart University, Türkiye* Mirabegron loaded transdermal patch for over active bladder	OC28A

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66	**A. Ouaddi**, B. Es-Sounni, M. Zefzoufi, A. Mouzdahir, K. Sraidi, N. Mazoir, M. El Yazidi, H. Bouamama, R. Fdil, M. Bakhouch *Chouaib Doukkali University, Casa El Jadida, Morocco* Design and hemisynthesis of new eugenol derivatives and evaluation of their biological properties	**OC35A**
67	**S. Ouni**, M. Jmai, M.O. Zouaghi, A. Abdelli, A. Gaucher, H. M'rabet, Y. Arfaoui, M.L. Efrit, D. Prim *FST - Tunis* Exploring regioselective 1,3-dipolar cycloaddition in the vinyl-triazole series: A straightforward approach to bis-heterocycles	**OC29A**
68	**M. Sebai**, R. Mechichi, S. Chatti, N. Jaffrezic-Renault *INRAP - Sidi Thabet* New impedancemetric biosensors for rare earth element detection	**OC22B**
69	**M. Sfar**, G. Souid, Z. Mzoughi, D. Le Cerf, H. Majdoub *FSM - Monastir* Hepatoprotective effect against cadmium-induced liver toxicity in rats of Foeniculum vulgare seed polysaccharides	**OC30A**
70	**N. Tka**, M.A. Hadj Ayed, P. Langer *FSM - Monastir* New 2,4-bis(arylethynyl)-9-chloro-5,6,7,8-tetrahydroacridines, synthesis and photo-physical properties investigation	**OC31A**
71	**N. Touj**, R. Gatri, L. Delaude *ISSTE - Borj Cédria* Synthesis and catalytic hydrogenation activity of ruthenium-arene complexes featuring aldiminium and 1,2,3-triazolium dithiocarboxylate zwitterions	**OC32A**
72	**D. Umereweneza**, T. Muhizi*, A. Gogoll, M. Erdélyi *University of Rwanda* Bioactive secondary metabolites from Rwandese medicinal plants	**OC40A**
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Abstracts of Oral Communications

Program of
Thursday
11 May 2023

Exploring optimal routes for the synthesis of new highly fluorinated β-diphosphoramidates

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Phosphoramidates are highly versatile compounds with broad applications in biomedicine, agriculture, and industry. They can therefore serve as prodrugs [1], chelating ligands [2,3] and can be produced through various strategies [4]. This study presents an effective method for synthesizing new highly fluorinated β-diphosphoramidates with the general formula $RN[(R_FO)_2PO]_2$ ($R = C_6H_5$, C_3H_5, C_4H_6; $R_F = CF_3CH_2$, $C_6F_{13}(CH_2)_2$). We used a preferred two-step approach for the synthesis of target products. The first step involves the preparation of the tetrachloride precursors, which were obtained by reaction of phosphorus oxychloride ($POCl_3$) with the corresponding primary amines. The resulting tetrachlorides, $RN(POCl_2)_2$, undergo in the second step alcoholysis with different fluoroalcohols to produce the desired β-diphosphoramidates. Attempts to access these products using different approaches are also highlighted. All the β-diphosphoryl compounds including the tetrachloride precursors were fully characterized using multinuclear (^1H, ^{19}F and ^{31}P) NMR spectroscopy.

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Design and synthesis of novel sulfamate linked 4-hydroxycoumarin hybrids

Biological and computational insights into the anti-α-amylase potential

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In a healthy, non-diabetic physiological state, insulin must attach to its receptors on cells to coordinate a series of transduction events that transfer glucose from the blood into cells for glucose catabolism [1]. Among several enzymes, α-amylase is considered as a therapeutic target for type 2 diabetes mellitus [2].

In this communication, various novel derivatives of substituted coumarin-sulfamates were designed and synthesized using 4-hydroxycoumarin as starting material and assessed for their α-amylase inhibitory potential. Most of these compounds showed good ability to inhibit α-amylase enzyme (IC_{50}= 0.52–6.01 μg/mL). Furthermore, they were computationally investigated and docked onto α-amylase active site. The newly synthesized compounds can be encouraged for future development as α-amylase inhibitors based on their inhibitory potency, selectivity, in vitro effectiveness, and pharmacokinetic profile.

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In-silico study of ellagic acid

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Since its discovery in 1831, ellagic acid (AE) has aroused the interest of many researchers for its various pharmacological actions. AE ($C14H6O8$) is a common metabolite present in many medicinal plants and vegetables **[1].** It is an antioxidant polyphenol present in many fruits and vegetables **[2].** It has many pharmacological activities such as anti-diabetic action **[3].** In this work, we focused on the antidiabetic potential of AE. We proceeded to the in-silico study of AE. This prediction encompasses the study of pharmacokinetic and toxicological properties and also consists of pharmacological docking of AE with different potential targets in relation to the antidiabetic action namely the receptor to human insulin, Human aldose reductase and tyrosine phosphatase. The strongest ligand-receptor affinity was observed with tyrosine phosphatase. The prediction of the pharmacokinetic parameters gave satisfactory results. The predictions of toxicity directed us towards geno-toxicity following the metabolism of AE.

Key words: ellagic acid, in silico, docking

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Study of Optical and Electro Properties of Bulk Hetero junction of Organic Solar Cells with Varying of active Layer Thickness by Simulation models

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In this paper we used different simulation models to study the most important factors that affect in a bulk hetero junction organic solar cells performance as a function of the active layer thickness, such as recombination rate, free electrons, free holes, trapped electrons, trapped holes and total carriers at maximum open circuit voltage. Other factors such as electron mobility, hole mobility, fill factor and the performance efficiency were studied at maximum current and hence at maximum power of the cell. The results show that the cell thickness is a major factor effects in the cell performance. The cell efficiency and the above factors are sensitive of the active layer thickness.

Keywords: organic solar cells; active layer; simulation; bulk hetero junction; cell efficiency.

Biochar: "new black gold" for environmental chemistry and sustainable future

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The present work is based on the principle of waste to wealth concept. There is huge amount of biomass waste available such as brewer's spent grain (BSG), a by-product of the beer industry. On an industrial scale, BSG creates challenges (management) as well as opportunities (biomass conversion and valorization), which is essential for sustainable development and circular economy. One of the best ways to implant this concept is to convert biomass into functional carbon material such as biochar (produced by thermochemical process) [1]. The main objectives are (i) to find suitable biomass grinding method to ensure obtaining mechano-chemistry-controlled porous structure, and (ii) a method of immobilization of nanocatalyst onto the biochar in order to design highly active composite catalysts in Fenton-like organic pollutant reaction.

We have highlighted the importance of different grinding techniques (home appliances: coffee mill, blender, mortar and pestle) of biomass to synthesize biochar with different morphology and heat capacity using same pyrolysis condition, and same biomass but the grinding method is varied. Also, pressure induced graphitization is observed. Interestingly, a novel Chinese tea leaf egg-like biochar [2] was synthesized successfully. Ag-Cu coated BSG biochar was prepared by the simple and green wet impregnation method, followed by pyrolysis of the metal salt-impregnated BSG powder. High catalytic activity which is reflected by the 100% mineralization of the methyl orange dye. The reusability test of the catalyst reveals 96% removal efficiency (after third cycles). Plot of $-\mathrm{Ln}\,(C_A/C_0)$ vs. time is a linear plot with $R^2 = 0.9892$ shows this process follows pseudo-first-order kinetics ($k = 0.603 \times 10^{-2}\ \mathrm{min}^{-1}$). Faster kinetics of the present catalyst towards methylene blue degradation observed in the methyl orange + methylene blue dye mixture [3].

This work provides general, simple and efficient strategies to design biochar materials with a clear indication of its contribution to address the UNs Sustainable Development Goals SDGs 3, 6, 11, and 13. On the sustainable development education viewpoint (SDG4), this approach can easily be implemented in a lab course, as high-performance biochar@nanocatalyst materials can be prepared, and tested within 4-8 hours.

Keywords: Biochar-immobilized nanocatalyst; Fenton-like reaction; Sustainable chemistry; Environmental remediation; Trash-to-treasure; Circular economy.

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Design and semi-synthesis of novel triterpenic acids and fluoroquinolones hybrids as potential antibacterial agents

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Maslinic acid (MA) and oleanolic acid (OA) are natural triterpenoids found as key compounds in *Olea europaea* L. These two hydroxy pentacyclic triterpene acids are fairly non-toxic and are found to exhibit versatile biological activities making them attractive scaffolds for chemical modifications [1] to change or enhance their biological potential and pharmacokinetic parameters [2]. In this communication, we first report an effective procedure for the selective isolation of MA and OA from olive pomace (*Olea europaea* L.). We then envisioned preparing hybrid molecules from isolated triterpene acids by joining them to fluoroquinolone scaffolds largely used in therapeutic chemistry as antibiotics, through rigid or flexible linkers. Thus, MA and OA linked to Ciprofloxacin and Norfloxacin as hybrid compounds were synthesized in order to study the potential antibacterial activity.

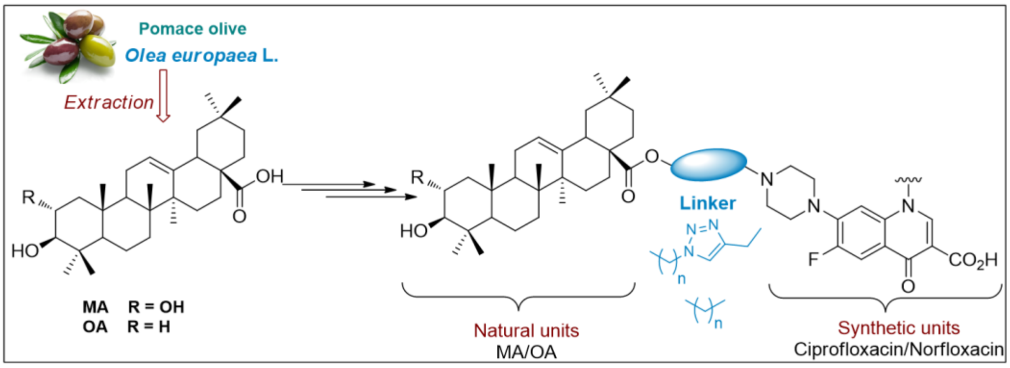

Figure 1: General structure of the synthesized hybrid compounds

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Synthesis and Antioxidant Assessment of some Derived Compounds from 2-Amino-3-Cyanothiophene

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In the current research work, we report the synthesis of thiophenic derivatives 1–3 resulting in good yields (88–90%). This synthesis was undertaken in mild reaction conditions between readily available 2-amino-3-cyanothiophene, aldehydes and 2,5-dimethoxytetrahydrofuran. These compounds were brominated with NBS (N-bromosuccenimide) leading to new derivatives, namely 4–6 at room temperature for 24 h. In addition, we investigated the antioxidant activities using DPPH (2,2-diphenyl-1-picrylhydrazyl) and total ABTS (2,2'-azinobis-[3-ethylbenzthiazoline-6- sulfonic acid]) methods in order to evaluate the antioxidant activity of the new synthesized compounds. The results credibly indicate that compounds 1 and 3 showed the highest antioxidant activities. These new thiophenic compounds can be invested as substrates in the catalysis of C-H activation reaction.

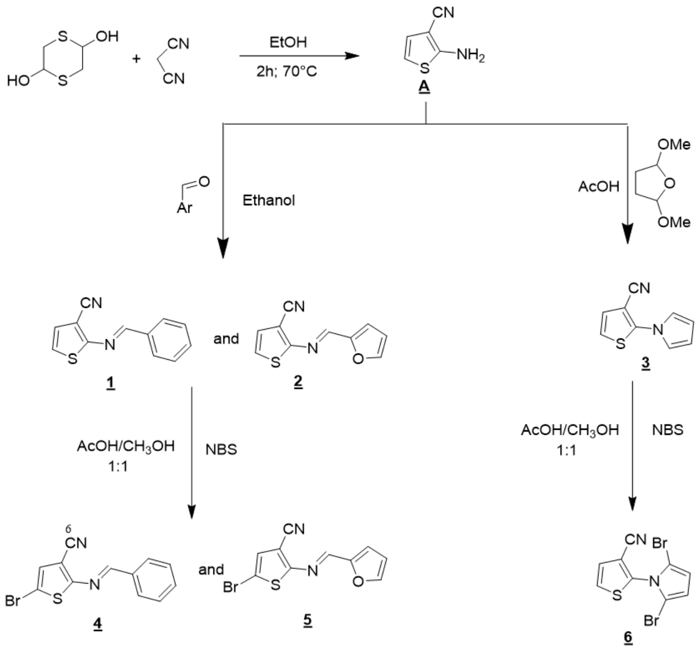

Figure 1. Synthesis and reactivity of 2-aminothiophene-3-carbonitrile.

Eco-friendly and efficient catalytic acylation of arenes with aromatic acyl chlorides, catalysed with iron (III) chloride under relatively mild conditions

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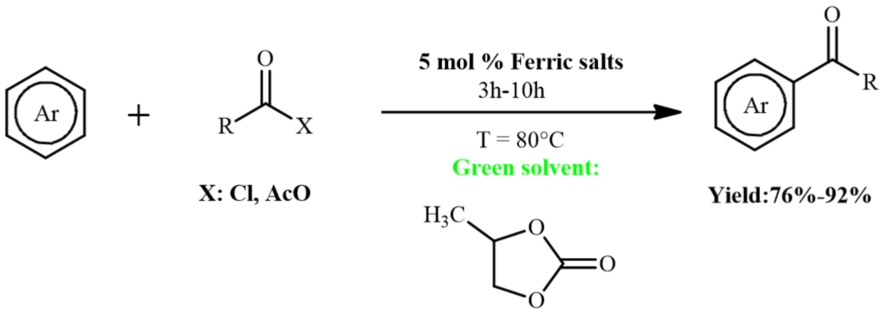
Aromatic ketones are widely used as key intermediates and precursors in the synthesis of pharmaceuticals and other fine chemicals [1]. Conventionally, the electrophilic acylations are catalyzed by metal halides (*e.g*. $ZnCl_2$, $AlCl_3$, $TiCl_4$, $FeCl_3$) [2]. Effectively, the strong complex formed between the ketone product and the metal halide itself requires the use of over-stoichiometric amounts of catalyst. Consequently, a large amount of toxic and polluting waste is generated.

The aim of this study is to develop an eco-compatible method for the synthesis of aromatic ketones using catalytic amounts of ferric salts as catalysts and a green and reusable solvent, *i.e.* propylene carbonate (PC).

Starting from different aromatics and acid chloride derivatives, the reactions catalysed with 5 mol% of ferric salts at 80 °C furnished aromatic ketones with good to high yields (Scheme 1).



Scheme 1

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SYNTHESIS OF BIOSOURCED POLYMERS FOR REMOVAL OF AROMATIC POLLUTANTS AND POLYPHENOLS FROM MARGINS

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The characteristics of margins give them a high toxicity against bacteria, plants[1], insects and even animals and human cells[2]. Furthermore, margins can contain more than 30 phenolic compounds[3]. The main phenolic compounds in margins are phenolic acids (vanillic, gallic, cafeic, Ferrulic), phenolic alcohols (3,4-dihydroxyphenyl ethanol (hydroxytyrosol) and p-hydroxyphenyl ethanol (tyrosol)),flavonoids (luteoline, luteoline -7-glucoside) and secoiridoids (l'oleuropéine, ligustroside).[4] In this context, the idea is to find different monomers to develop a new soluble polymer, which are able to adsorb the polyphenols from the margins. For several years, a number of scientists have tried to use bio-based monomers like 1.4-3.6-dianhydrohexitols (both for the abundance of the raw material and for their non-toxicity). These types of polymers present a combination of excellent properties such as amorphous transparency, high glass transition temperatures (TG >230 °C), high hydrolytic stability, low sensitivity to oxidation, chirality and rigidity. Furthermore, these polymers are synthesized in a single step also summarized by a polycondensation with different monomers; it is an aromatic nucleophilic substitution in a polar aprotic solvent, with the presence of a catalyst (K_2CO_3). The characterization of these polymers was performed by NMR spectroscopy, MALDI-TOF, differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA); they are also analyzed by ultra-high performance liquid chromatography. The adsorption results show that the new synthesized polymers based on isosorbide can effectively remove the polyphenols and organic pollutants studied (polar and non-polar, 90% to 100%).

Keywords: margins, phenolic compounds, polyphenols, biosourced monomers, polymers, adsorption, organic pollutants

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Synthesis of new phosphorylated heterocyclic compounds via 1,3-dipolar cycloaddition reactions

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Organophosphorus compounds are widely used in several vital areas. They are used primarily as pesticides[1], flame retardants[2], *anti*-tumor and *anti*-tuberculosis agents[3].

Five membered heterocyclic compounds, such as tetrazolin-5-one, 1,2,3-triazoles are well known in biological, medicinal, and industrial fields.

In the present work, we describe the synthesis of new phosphorylated tetrazolin-5-ones, tetrazolin-5-thiones and 1,2,3-triazolocarbamates bearing different substituents. These new products were synthesized from the reaction of dichlorophosphoryl isocyanate, diethoxyphosphoryl azide, and diethoxyphosphine with different organoazides, 1,2,3-triazolo-1,4-disubstituted alcohols and organo isocyanates via 1,3-dipolar cycloadditions.

Key words: 1,2,3-Triazole, Dichlorophosphoryl isocyanate, Carbamate, Tetrazolin-5-one, Tetrazolin-5-thione, Phosphoryle, 1,3-Dipolar Cycloaddition.

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Intercalation of metformin hydrochloride into organosmectite: Excipient application.

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Clays are an important class of natural materials that can be employed in pharmaceutical products as excipients. The objective of this study was to test excipient propriety of organosmectite (HDTMA-Sm). Mineralogical and chemical characterization of clays was performed with the aid of tools like XRD, DSC analysis, CEC, PSD, BET surface area and Point of zero charge (PZC). The smectite clay presented most important the textural and porosimetric results (CEC, S_{BET}, PSD). The modified smectite showed the highd_{001} basal spacing (39.73 Å) which proved to be successful intercalation of surfactant within the clay layers and HDTMA molecules in modified clay have taken a paraffin-type bimolecular arrangement. Adsorption experiments of metformin hydrochloride MET into clay were carried to obtain a controlled drug release system. The influence of pH, contact time and initial concentration were evaluated. The MET/clay was characterized by FT-IR. The studies revealed that maximum loading of the MET was influenced by surface proprieties of used clay. The total amount intercalated of MET was 12.42 and 21.97 mg.g^{-1} for clays Sm and HDTMA-Sm, respectively. According to the FT-IR spectra, it was confirmed that MET molecules were well stabilized in the interlayer space of purified and modified smectite and provided different mechanism of interaction MET/clays.

Keywords: Organosmectite, excipient, MET, adsorption.

X-ray crystallography, spectral analysis, DFT studies, and molecular docking of ($C_9H_{15}N_3$)[$CdCl_4$] hybrid material against methicillin-resistant staphylococcus aureus (MRSA)

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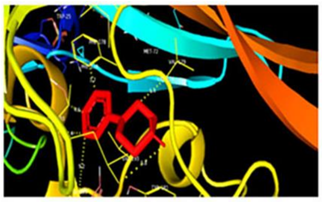
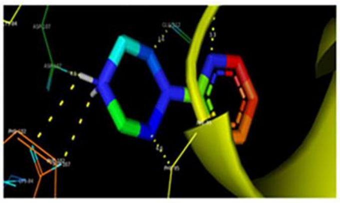
The one dimensional polymer complex ($C_9H_{15}N_3$)[$CdCl_4$], was synthesized and characterized by X-ray crystallography, FT-IR vibrational, and thermal analysis, UV–Visible and photoluminescence (PL) spectroscopic investigations. The crystal structure crystallizes in the monoclinic space group C2/c with Z ¼ 4. Significantly, in order to reveal the vibrational modes of the named chemical, the Infrared and Raman spectra were registered. Then, 13C and 113Cd solid-state NMR was employed to characterize this hybrid material using a polar solvent to conduct an investigation of the optical characteristics for the UV visible range. Consequently, utilizing the highest occupied molecular orbital and the lowest unoccupied molecular orbital (HOMO–LUMO) calculations, the molecule's energy gap (Eg) was determined. More so, the PL tests revealed two peaks at about 400 and 423 nm while the Hirshfeld surface (HS) analysis and DFT calculations were also carried out to acquire insight into the role of weak molecular interactions in the complex that affect the self-assembly process and crystal packing. In addition, molecular docking experiments with the 6U3Y, 1SAX, and 2D45 receptors reveal ideal postures with intriguing binding affinities of 5.2, 5.6, and 5.7 kcal.mol^{-1}, respectively. Lastly, thermo-differential analysis techniques (DTA) and thermogravimetric analysis techniques (TGA) were used to account for the thermal degradation of the current complex.

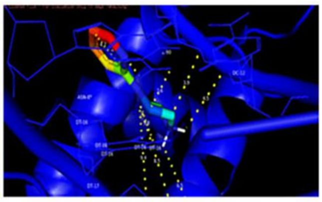
Keywords: Crystal structure, spectroscopy, electronic properties, molecular docking



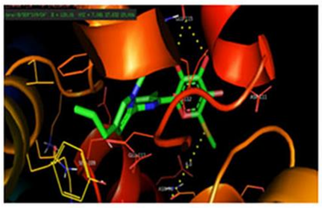
($C_9H_{15}N_3$)[$CdCl_4$] _ 6U3Y



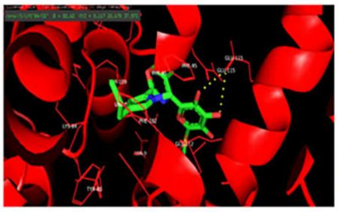
($C_9H_{15}N_3$)[$CdCl_4$] _ 1SAX



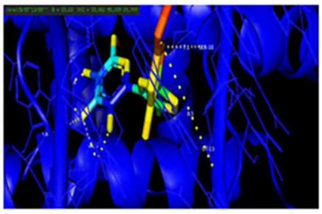
($C_9H_{15}N_3$)[$CdCl_4$] _ 2D45



Clindamycine _ 6U3Y



Clindamycine _ 1SAX



Clindamycine _ 2D45

Rapid Synthesis of Ternary Heteroatom–Doped Carbon Quantum Dots Under Microwave Irradiation and Their Biomedical Application

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Carbon-based nanomaterials have gained a lot of attention for use as luminescent probes for biomedical application. Herein, a rapid microwave-assisted method for synthesizing ternary heteroatom-doped carbon quantum dots (h-CDs) is described. The h-CDs, prepared by doping CDs with B, N, and S (referred to as BNS-CDs), or P, N, and S (PNS-CDs), or Mn, N, and S (MnNS-CDs), all showed excitation wavelength-independent photoluminescence properties. The quantum yields of BNS-CDs (24.9 %), PNS-CDs (51.9%), and MnNS-CDs (17.7 %) suggest that they have excellent potential for use as fluorescence imaging agents. MnNS-CDs displayed the highest r_1 reflexivity (5.30 $s^{-1}mM^{-1}$) and a low r_2/r_1 ratio of 5.27, suggesting their high potential as a T_1-weighted magnetic resonance imaging contrast agent. Furthermore, conjugation of MnNS-CDs with hyaluronic acid (HA) (MnNS-CDs@HA) endowed them with high biocompatibility and the ability to specifically target CD44-overexpressing B16F1 cells, as verified by in vitro fluorescence and magnetic resonance imaging analyses. Moreover, to impart specific targeting capability and higher biocompatibility PNS-CDs were functionalized with hyaluronic acid (HA). In vitro (cell viability) and in vivo (zebrafish) studies revealed lower cytotoxicity and higher biocompatibility. The in vitro fluorescent imaging results in B16F1 cells with CD44-positive-receptors and with receptor-deficient HeLa cells indicate that cellular uptake was based on specific targeting endocytosis methods. Furthermore, the in vivo imaging results of zebrafish confirmed that PNS-CDs@HA as probe affords paradigm to be applied in basic biomedical research and theranostic applications. However, in vitro (B16F1 and HeLa cells) and in vivo (zebrafish embryos) studies showed no apparent cytotoxicity of the h-CDs, thereby proving their potential as possible theranostic agents.

Keywords: Heteroatom-doped, Carbon quantum dots, Luminescent probes, magnetic resonance imaging, Zebrafish imaging

Isothermal sorption of pharmaceutical product into luffa activated carbon

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Today, environmental protection and pollution control issues have become a major concern in research programs as well as in economic and political decisions.

Indeed, our environment is confronted with an increase of industrial activities, which can cause very important ecological disasters such as the pollution of drinking water reserves. Therefore, the depollution of this water contaminated by chemical products such as pharmaceuticals, dyes, pesticides is necessary for the protection of the environment as well as for a possible reuse of this water. Certainly many technologies used for the treatment of these industrial effluents are expensive; therefore, the technique of adsorption seems to be well adapted to the pharmaceutical industry because of its proven effectiveness in the elimination of organic pollutants and for economic considerations.

So the objective of our work is the valorization of a low cost biomaterial which is luffa cylindrica for the purification of an anti-inflammatory in aqueous solution. Indeed, as a first step we opted to produce an activated carbon from organic luffa using combined physical-chemical way. Then in a second step, textural characterization and adsorbent properties were analyzed using FTIR, DRX and pH_{PZC}. Finally, we studied the isotherms of adsorption of this carbon.

The study of the pharmaceutical product adsorption thermodynamics into AC allows drawing the following conclusions: The maximum adsorption capacity is of the order of 89.25mg/g. Then Langmuir, Freundlich and Temkin models modeled the experimental curves obtained. The Langmuir-Freundlich model is the most adequate model. The determination of the thermodynamic parameters; ΔG, ΔH and ΔS show that the bio sorption of the pharmaceutical product by the Luffa Activated Carbon (LAC) is spontaneous, physical and exothermic.

Finally, it can be stated that the adsorption of the drug on luffa cylindrica is a favorable process.

Keywords: Pharmaceutical product, Activated carbon, Adsorption, Modeling isotherms, luffa cylindrica, Valorization.

Synthesis and Characterization of ZIF-8 Hybrid Thin Film Deposed on Glass Substrate

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The processing of Metal organic frameworks (MOFs) as thin films is a topic of pronounced technological importance [1]. In fact, MOFs are a promising class of porous nanostructured materials constructed from metal ions, and organic linkers [2]. The preparation of microporous thin films of these materials adds to their applicability as sensor coatings, membranes and catalysis [2]. In these circumstances, many innovative synthetic strategies for MOF thin film have been recently reported including layer-by-layer deposition on solid substrates. The basis of this technique is that the reaction components are combined in a sequential manner. A distinct advantage of this growth mode is that it provides homogeneous, highly crystalline MOF films. In this work, we describe a simple and straightforward methodology based on the in-situ conversion of zinc hydroxides to Zeolitic imidazolate framework-8 (ZIF-8) thin film on glass supports using the layer by layer growth method The obtained product was characterized by ATR-FTIR(IR), Fourier X-ray diffraction (XRD) and optical and scanning electron microscopy.

Keywords : Zinc hydroxide, MOFs, conversion

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C-substituted poly(1,2,3-triazolium)s obtained through metal free AA+BB polyaddition of activated dialkynes

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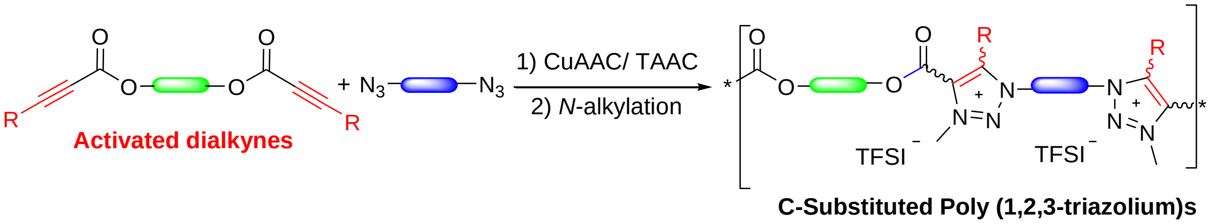
Copper(I)-catalyzed azide/alkyne cycloaddition (CuAAC) is a powerful tool that regiospecifically induces the formation of 1,3,4-trisubstituted 1,2,3-triazolium poly (ionic liquid)s (TPILs).[1,2] However, despite the robust and orthogonal nature of CuAAC, the use of copper-based catalysts has raised some concerns about cytotoxicity[3] and the deterioration of some optoelectronic properties of the obtained TPILs.[4] Furthermore, CuAAC is rarely applied when using internal alkynes. Herein, 1,3,4,5-tetrasubstituted poly (1,2,3-triazolium)s are synthesized via a catalyst-free polycycloaddition between azides and activated-internal dialkynes. The physical properties of the obtained 1,4,5-trisubstituted poly (1,2,3-triazole) intermediates were compared to 1,4,5-trisubstituted poly (1,2,3-triazole)s obtained via CuAAC using DSC, TGA, SEC and NMR analysis. The regioisomeric 1,4,5-trisubstituted poly(triazole)s underwent quaternization to obtain 1,3,4,5-tetrasubstituted TPILs that exhibit ionic conductivity of ca. 2.7 × 10^{-6} Scm^{-1} at 30 °C. This work demonstrates a straightforward method that affords regiomeric-TPILs with thermal and ion-conducting properties which are on par with the non-regiomeric TPILs obtained from CuAAC.



Scheme 1. Synthesis of poly (1,2,3-triazolium)s from activated alkynes

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Thermotropic Liquid Crystalline Poly(arylidene-ether)s

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A series of poly(arylidene-ether)s based on cyclohexanone moiety were synthesized from 2,6-bis(3-ethoxy-4-hydroxybenzylidene) cyclohexanone and various dibromoalkanes by solution polycondensation technique. *FT-IR*, ^{1}*H-NMR* and Mass Spectroscopy were used to characterize the structure of the new monomer and poly poly(arylidene-ether)s. The resulting polymers had inherent viscosities in the range of *0.73-0.98 dl/g* and the obtained polymer is easily soluble in aprotic organic solvents. Thermogravimetric analysis *TGA*, differential scanning calorimetric *DSC* analyses were made for all the synthesized polymers in order to study their thermal behaviour and liquid crystalline properties. The temperatures of *10%* weight loss occurred above *190 °C*, and the glass transition temperature T_g was in the range of *56-85* °C. *DSC* profiles of poly poly(arylidene-ether)s with aliphatic spacer length *6,8* and *10* revealed both melting transition T_m and isotropization transition T_i peaks. It implies that these polymers exhibited thermotropic liquid crystalline behaviour. Polarized optical microscopy *POM* study confirmed the liquid crystalline characteristic of these polymers. Schlieren textures at *185* °C (*Ti*) were visually observed under *POM*.

Keywords—thermo tropic liquid crystal, poly(arylidene-ether)s, flexible spacers, polycondensation, polymerization.

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CB-doped Laser-induced graphene electrodes scribed on polyethersulfone membranes for flexible high-performance microsupercapacitors

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A simple and expandable methodology was successfully designed to produce laser-induced graphene, from novel pristine aminated polyethersulfone (amPES) membranes, and to apply them as flexible electrodes for microsupercapacitors (MSCs). The fabricated amPES membranes have been additionally doped with various weight percentages of carbon black (CB) microparticles to enhance their energy storage properties. The lasing of the membranes allowed the formation of sulfur- and nitrogen-doped graphene electrodes. The effect of the electrolyte nature on the electrochemical performance of as-prepared electrodes was firstly investigated and the specific capacitance was clearly enhanced in the presence of 0.5 M $HClO_4$ aqueous electrolyte. The highest areal capacitance of 47.3 mF·cm $^{-2}$ was obtained with N,S-co-doped graphene electrodes at a current density of 0.25 mA·cm $^{-2}$. Such a specific capacitance is about 4.3 times higher than the average value reported in the literature for commonly used polyimide (PI)-based membranes. Furthermore, the energy and power densities exhibited by the modified amPES membranes are as high as 9.46 µWh·cm $^{-2}$ and 0.3 mW·cm $^{-2}$ at 0.25 mA·cm $^{-2}$, respectively. After 5,000 galvanostatic charge discharge cycles, more than 100% of capacitance retention was reached and the coulombic efficiency was improved up to 96.67%.

Surface Properties Evaluation of CAD/CAM PMMA Denture Compared to Compressed Molded PMMA: *In Vitro* Study

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[3] Oman Dental Collage Muscat

PMMA (Polymethyl methacrylate) is a crucial material in dentistry for removable dental restorations. For edentulous patients, complete dentures (CDs) are the only available treatment. These CDs can be manufactured using two techniques: (i) conventional compression molding technique and (ii) CAD/CAM technology. The objective of this study is to evaluate the surface properties of CAD/CAM PMMA denture compared to compressed molded PMMA, manufactured using the conventional compression molding technique and CAD/CAM technology. The study consisted of twenty samples, divided into two groups based on their manufacturing technique (conventional and CAD/CAM), with five samples assigned to each test. The surface properties of the samples were tested using micro-hardness and roughness tests after immersing the samples in artificial saliva at 37°C for one week.

The results indicate that using different manufacturing techniques for PMMA CDs leads to differences in measured characteristics that affect their suitability as the only available treatment for edentulous patients. However, statistical analysis using SSPS tools shows that the differences are not significant between the conventional compression molding technique and CAD/CAM technology.

Despite the lack of statistical significance, the PMMA CDs manufactured using the CAD/CAM technology route are recommended due to their better surface hardness resistance properties.

Keywords: polymethylmethacrylate, CAD/CAM, denture base resins, micro-hardness, roughness

Application of an experimental design methodology for the optimization of cosmetotextile impregnation process by β-cyclodextrin based microcapsules

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The design of cosmetotextile is facing issues related to the many parameters that influence the functionalization process of textile fabric i.e. the temperature, the treatment duration, the choice of reagents and their concentrations, … To find optimal conditions for the multi-parameter process, Design of Experiment (DoE) statistical analysis provides a rigorous methodology allowing the determination of the most suitable ingredients, their concentrations and the process Parameters. Among the various multivariate DoE-based methods, the Box–Behnken Response Surface Methodology (RSM) developed by Box and Wilson is especially used in the design of experiments for optimization purpose.

As a contribution in this area, neroline-loaded microcapsules based on β-cyclodextrin polyurethane material, described in our previous work, were fixed on cotton fabric using an impregnation technique. The process parameters were optimized so as to achieve a maximum microcapsules deposition and binding. Simultaneous evaluation and optimization of the effects of interdependent parameters was achieved using an experimental design based on response surface methodology. The selection of the mathematical model and its use for statistical analysis were done by the least squares method using the Minitab 19 software. The optimal impregnation conditions yielding a fabric mass gain of 8.56% are as follow: 21 $g.L^{-1}$ for the microcapsules concentration, 31 $g.L^{-1}$ for the polyurethane cross-linker concentration and 0.72 $g.L^{-1}$ for the cationic surfactant concentration.

Keywords: Microcapsules; impregnation process; cosmetotextile; optimization; experimental design; response surface methodology.

Extraction of cellulose from the Alfa fiber in order to be introduced as an enforcement in a polymeric matrix. Optimization of the extraction by the methodology of design experiments.

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The enforcement of polymeric matrix is widely used in many industrial activities such as plastic injection of automotive component. But the commonly used enforcement is glass fibers. This type of enforcement improves the mechanical properties of polymers but his main problem is the increase of weight and his non biodegradability.

The aim of this study is to replace the glass fiber enforcement by Alfa fiber cellulosic enforcement in order to create a competitive bio composite lighter and with the same mechanical properties. Therefore, we investigated in the first step the extraction of Cellulose from Alfa fibers. In order to optimize the extraction, we used the methodology of design experiments.

It was found that the extraction fits the centered composite design. Results were discussed and analyses were proven using FTIR and HPLC techniques.

Keywords: Polymer enfoncement, cellulose, experiment design

A new turn-on fluorescence sensor based on carbazole chromophore unit for the selective detection of Al^{3+}

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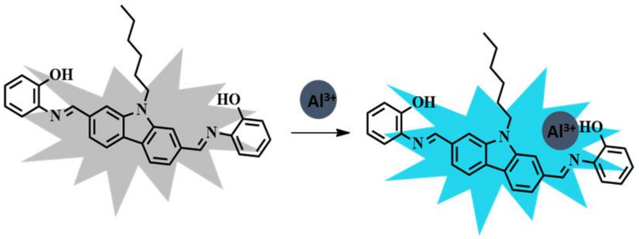
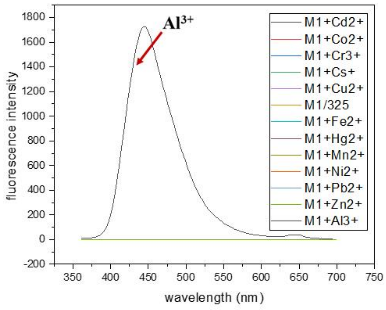
A new Schiff base sensor containing carbazole moiety CarAp was synthesized by the condensation of 9-hexyl-2,7-bisformylcarbazole with 2-aminophenol. The structure was confirmed by 1H NMR and FT-IR spectroscopies. The sensing action was studied by fluorescence spectroscopy in presence of Al(III), Cr(III), Mn(II), Fe(III), Co(II), Ni(II), Cu(II), Zn(II), Cd(II), Cs(I) and Pb(II) in THF-H_2O medium. For this, 20 equivalents of different metals ions were added separately to the solution of the ligand CarAp. A short time after adding cations, the colour of the solution containing Al^{3+} changed from yellowish to colorless and no such change was observed with other metal ions. Furthermore, the solution CarAp+Al^{3+} shows an intensive emission under UV-irradiation at 365nm. These results confirmed the colorimetric sensing behaviour of sensor towards aluminum ions. In another hand, with the excitation at 325 nm, the emission intensity of the probe increases massively in the presence of 1 equivalent of Al^{3+} : a turn on fluorescence phenomenon[1]. No other metal has any significant effect on the enhancement of the emission intensity of the probe in the detection process for either of the metal ions. The titration of aluminum and with drawing the Job's Plot, the stoichiometry ratio of CarAp-Al^{3+} was determined as 1:1 and a detection limit of 400 nM.

Keywords:
Carbazole; Schiff-base; Optical chemosensors; Heavy ion metals; Turn-on fluorescence

Graphical abstract





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Kinetic and thermodynamic analyses for pyrolysis of some cellulosic herbaceous biomasses

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The pyrolysis behaviors and kinetics study of some kinds of grasses including Juncus inflexus L. (JIL) and Cortaderia selloana (CS) were investigated by using thermogravimetric analysis (TGA) technique under nitrogen atmosphere at four different heating rates 5, 10, 15 and 20 ^{o}C/min. Thermogravimetric analysis showed three distinct zones of thermal decomposition for both biomasses: cellulose, hemicellulose and lignin. Two model-free (isoconversional) methods, Kissinger-Akahira-Sunose (KAS) and Flinn-Wall-Ozawa (FWO) were used to determine the apparent activation energy. Activation energy average values were shown to be 296.29-290.69 kJ mol^{-1} for (CS) and 216.75-215.07 kJ mol^{-1} for (JIL) as calculated by KAS and FWO methods, respectively. By using master plots parameters (Criado method) the reaction mechanism for each biomass pyrolysis was determined. The results showed that the main process reaction mechanism could be characterized by successive reactions. The thermodynamic parameters for both samples show positive values of enthalpies (ΔH), Gibbs free energies (ΔG) and the entropies (ΔS) exhibited that both grasses were endothermic.

Keywords: pyrolysis, kinetics, thermogravimetric analysis (TGA), activation energy

PC/ABS/PMMA blends optimization via mixture design

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In our modern society, plastic is an important class of materials. They found applications in several fields such as construction, medicine, packaging, electric and electronic engineering. However, the carbon footprint related to the production of plastics is very high. Throughout their lifecycle, plastics emit 3.4% of global greenhouse gas emissions. Recycling is the most attractive alternative for reducing this carbon footprint. In this study, our goal is the recovery and the recycling of end-of-life computer plastics. Therefore, polycarbonate (PC) and acrylonitrile-butadiene-styrene (ABS) mixtures were chosen. Blends of PC/ABS in different ratios, both with and without a coupling agent, poly(methyl methacrylate) (PMMA), were prepared by using a contra-rotating twin-screw extruder followed by injection moulding. The optimal formula is achieved by using experimental design, specifically mixture design.

Keywords: polycarbonate, poly(methyl methacrylate), Poly(acrylonitrile/butadiene/styrene), coupling agent, mixture design, twin-screw extruder, injection moulding

Preparation and characterization of poly(lactic acid)- calcium phosphate composites for 3D-printing

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The aim of this study is to evaluate the 3D printing of Polylactic acid (PLA) /β-tricalcium phosphate (TCP) biocomposites with different TCP contents (5, 10, and 15wt%). The combination of PLA matrix with TCP particles was chosen to better mimic real bone, both in terms of achieve osteoconductivity and bone formation. PLA/TCP films were produced by the solvent casting procedure and characterized by scanning electron microscopy in order to analyze the dispersion of β-TCP in the polymeric matrix, X-Ray diffraction, thermogravimetric analysis, glass transition, crystallization and melting temperatures were determined using differential scanning calorimetry analysis. The morphological analysis showed that β-TCP was uniformly dispersed in the PLA matrix. In addition, β-TCP blocked the movement of PLA chain segment which leads to a small change in Tg. Thermogravimetric analysis confirmed the homogeneity of the film since the value of residue found at 500°C are close the amounts of β-TCP introduced in the biocomposites.

Keywords: biocomposite, β-tricalcium phosphate, poly(lactic acid), Differential Scanning Calorimetry.

Optimization and comparison study of adsorption and photo sorption processes of mesoporous nano-TiO_2 during discoloration of Indigo Carmine dye

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This study focuses on the removal of Indigo Carmine (IC) dye using synthetic titanium dioxide (TiO_2) nanoparticles. The investigation of surface charge recorded a pH_{zc} equal to 4.25. The optimization of the adsorption process using a central composite design (CCD) model identified 57 min as the optimal contact time. For optimum IC contents of 30 and 58 mg/L, the recorded adsorption capacities were 123 and 261 mg/g in the dark reactor (DR) and sunlight reactor (SR), respectively. The thermodynamic investigation suggests an endothermic and spontaneous physisorption process, and the regeneration tests show higher stability of the mesoporous TiO_2 in the SR.

SEM and TEM analyses show a TiO_2 agglomeration in DR and nanoparticle swelling in SR.

Keywords: Adsorption, carmine indigo, TiO_2, CCD optimization.

Composite films based on mucilage from *Opuntia ficus-indica* (Cactaceae)

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Biobased composite films have been produced from *Opuntia ficus-indica* (Cactaceae) mucilage, extracted in hot water, precipitated in two organic solvents, and blended with synthetic rubber. The microstructure, thickness, moisture content, density, water contact angle, water vapor permeability, film solubility, thermal stability, and toughness of mucilage films were measured. The properties of mucilage-based films varied systematically, depending on the concentration of mucilage. The produced films have hydrophobic, flexible, and stiffer properties. The mucilage film incorporated with 6% of mucilage achieved the highest Young's modulus. The thermal analysis shows that the synthesized films were structurally stable at high temperatures. All films exhibit low water vapor permeability (WVP), which causes good barrier properties. The results show that *Opuntia ficus-indica* (Cactaceae) mucilage can benefit specific applications, especially food packaging.

Key words: *Opuntia ficus-indica*, mucilage, film, flexible.

Effect of Nano Particle Size and Concentration of Recycled Acid Resistant Brick Powder on Shore Hardness of Linear Low Density Polyethylene Thermoplastic Composites

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Typically, the behavior of filled polymers is predicted using the interface attraction between the filler and the polymer. Due to their many applications and low cost, particle filled polymer composites are becoming more and more common. The desired functional features of the composite material have been added using modified nanofillers.

The current investigation focused on a nanometric powder made from acid thermal brick waste that had been utilized to line the furnaces of the Misrata Iron and Steel Complex. There is less waste from acid-resistant brick on the Misrata Iron and Steel Complex site when linear low-density polyethylene (LLDPE) of Raslanuf is blended with acid-resistant brick as a nano filler material adjust its hardness.

The linear low-density polyethylene was combined with the nanopowder granular-sized powder 45 nm in various weight proportions (3, 5, 7, 10 and 12w%) and was bonded by polyethylene gelcol 600; extruded was then carried out at a temperature equal to 200°C and a speed of 25prm/min, followed by injection at a modified parameter (190°C, 16 bar to 600sec). The resulting composite products were then used to investigate the behaviors of hardness qualities and characterize their batches using electronic scanner microscopy (SEM), polarize microscope, X-ray diffraction (XRD), and inferred spectroscopy (FTIR) techniques in order to determine their composition and structural structure. The results showed that the hardness of LLDPE composite increased from 45.67 to a maximum value equaled 48.63 shore D, at 12 weight percent of filler. At the highest weight fraction of filler, the composite material will have a high hardness. polarized microscopy showed that as the filler was corporate to LLDPE matrix, nanopowder particles tended to good distribution and compatibilized with LLDPE in composite batch, and XRD shows that the intensity was greater, hence, more crystalline.

Key: Nano- filler, Hardness, Raslanuf Linear Low-Density Polyethylene, Recycling Refractory brick

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12 May 2023

Analysis in vitro and in silico of the anti-obesity activity of a new functionalized chitosan based on triazole-carbazole

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Obesity is considered a primary chronic metabolic health problem. Being overweight or obese is widely considered a serious health problem worldwide. Unfortunately, the possibility of creating an effective treatment to prevent or treat obesity seems more difficult to achieve. On the other hand, many interesting initiatives to develop polysaccharide derivatives are mentioned for the treatment or prevention of obesity and related health problems. Polysaccharides are valuable because of their wide variety of biological activities. The most abundant and renewable polysaccharide on earth, after cellulose, is chitosan.

Chitosan and its derivatives have been shown to have diverse biological activities. In the present work, it is reported the synthesis carried out and the characterization of a new chitosan derivative by click chemistry with biological purposes such as anti-obesity activity. The material derived from the synthesis was found to be soluble in common organic solvents and its structure was validated by XPS and IR-FT. The anti-diabetic activity of the developed triazole biomaterial was tested in vitro and by molecular docking analysis.

Key words: chitosan, triazole, click chemistry, anti-obesity

Synthesis and Characterization of 3-Methylene Isoindolinones by Two Synthetic Routes

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The aim of this study was a detailed examination of the synthesis of 3-methyleneisoindolinones comprising various functional groups. Methylmagnesuim bromide and PTSA was employed for the synthesis of these compounds. A wide range of 3-methyleneisoindolinones were afforded in good to excellent yields. On the other hand, 3-methyleneisoindolinones was also obtained by an efficient microwave method [1]. The frame work of these derivatives was constructed from 2-acetylbenzoic acid and various primary amines via two-component reaction. The obtained compounds were characterized by ^{1}H NMR, ^{13}C-NMR and IR and elemental analysis [2].

Key words: Microwave-assisted synthesis;3-methyleneisoindolinones, methylmagnesuim bromide

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A DFT Study on the Chemical Fixation of CO_2 with Aziridine Catalyzed by NaBr Salt: Solvent Effects on Activation Barriers

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Chemical fixation of carbon dioxide into value-added products is a promising idea.[1-3] We report in the present work, the cycloaddition of carbon dioxide with aziridine catalyzed by NaBr/H_2O system to produce a five-membered cyclic carbamate, oxazolidin-2-ones, has been extensively studied using DFT method at B3LYP (+D3) /6–31+ G(d) in gas phase and CPCM solvation model. The titled reaction was investigated in the absence of catalyst and in the presence of NaBr alone and NaBr/H_2O mediated pathways. Two reaction mechanisms were proposed for the studied reaction in each catalyst systems, and their corresponding energetics are investigated to identify the favorable path. Theoretical results indicated that mechanism (I) is more favorable pathway kinetically and thermodynamically than mechanism (II). Finally, this work validates that NaBr in the presence of H_2O showed better catalytic activity for the studied reaction and water was found to be good solvent for NaBr catalyzed cycloaddition of CO_2 with an aziridine.

Key words: CO_2, Chemical fixation, Oxazolidinone, NaBr, H_2O, DFT, Aziridine

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Structural and Spectral Properties of New Hybrids based on Coumarin Moieties and Clay Materials

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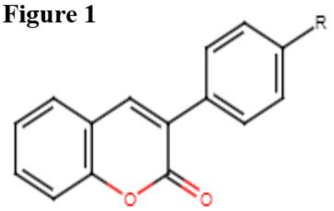
Coumarin is a natural compound found in many plants that exhibits important luminescent properties, making it an attractive material for use in variety of applications [1]. Coumarin derivatives have been extensively studied for their ability to form stable complexes with metal cations, which is important for the development of chemical sensors [2]. Herein, two designed fluorescent compounds **FC1** and **FC2** (Fig.1), synthesized by Mhiri and al.[3], were characterized via H^1NMR, UV-vis and Fluorescence spectroscopies. **FC1** and **FC2** showed blue fluorescence emission extending from 370 to 480 nm. (Fig 2: FC.Cu^{2+} complex)
Recent advances in the development of coumarin-based clay hybrids were also highlighted, since the interaction of fluorophores with clay minerals engenders a synergy in optical properties [4]. The XRD results showed the presence of new rays on the Zinc-Montmorillonite (Zn-Mt) diffractogramme. **FC1** was adsorbed on the surface of Zn-Mt, while **FC2** has increased the interlayer space d_{001} from 14.86 to 16.07Å. This increase shows the intercalation of **FC2** onto Zn-Mt, due to its complexation with the interlayer cation: Zn^{2+}.

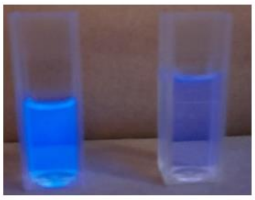
Figure 1



FC1: R= CH_3

FC2: R= Cl

Figure 2



Keywords: Coumarin, Clay, Fluorescence, Hybrid.

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Use of Tunisian Phosphogypsum to produce Reinforced Plaster

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The production of phosphoric acid from natural phosphate rock by the wet process gives rise to an industrial by-product called phosphogypsum (PG). About 5 tons of PG are generated per ton of phosphoric acid production, and worldwide PG generation is estimated to be around 100-280 Mt per year. The aim of this work is to add value to this waste; After characterization, the PG was calcined and treated with calcium carbonate to reduce curing time. The cellulose fibers are characterized at the end to choose the most effective way to reinforced the phosphogypsum (PG) by two types of cellulosic fibers are witch introduced (*prunus amygdalus, tamaris)* into PG with different mass percentages of 0%, 10%, 20%, 30%, 40% and 50%. The study involved physical, chemical, mechanical and environmental tests on the obtained plaster. The obtained results showed that the incorporation of cellulosic fibers increases the mechanical property and decrease the water solubility. The density of the final product depends on nature of fiber and is low compared to the commercial product.

Key Words: phosphogypsum, composite material, plaster, cellulosic fibers.

Adsorption of water pollutants using polyethersulfone modified silica gel

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Due to the development of human activities in the recent decades, notably in agricultural, industrial and civil sectors, water pollution was dramatically araised, causing serious environmental and health problems [1]. Among different contaminants, aromatic organic compounds attracted considerable attention due to their toxicity, non-biodegradability and carcinogenic nature [2]. Many scientists suggest hybrid organic-inorganic adsorbents, with high specific surface area and enhanced adsorption capacities. In the present work, we describe the synthesis of a new organic-inorganic stationary phase from renewable resources. A silica gel coated with a semi-interpenetrating network based on semi-biosourced poly(ether-sulfone) was studied for pollutant extraction. The polar semi-INP network can be rapidly anchored to the silica surface due to the high concentration of polar silanol groups. The developed adsorbent phase was tested for nine aromatic pollutants. An optimized composition of the semi-interpenetrating network (80% of the linear polymer: poly(ether-sulfone) based on isosorbide and 20% of bismaleimide cross-linking agent) leads to a total adsorption of the selected pollutants, whatever their hydrophilicity.

Key words: Organic-inorganic adsorbents, Semi-Interpenetrating Network, Poly(ether-sulfone), Isosorbide, Bismaleimide, Adsorption.

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Posidonia Oceanica balls: Chemical Composition

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Posidonia oceanica balls are the dominant sea grass in the Mediterranean Sea. This biomass has great potential for use as a novel lignocellulosic material on an industrial scale. The rational valorisation of these available renewable resources fits very well with the recent sustainable approach, commonly established everywhere. During this paper, the chemical composition of *Posidonia oceanica* balls was established according the TAPPI standard methods. The obtained results show clearly that the marine biomass present a high polysaccharide i.e. 68% and it can be justified to investigate in many applications and specially to produce fibre.

The delignification step was done by using soda-anthraquinone process. The obtained fibre was characterized by several methods by determination their mechanical, chemical, thermal and morphological behaviours.

Key words: *Posidonia oceanica balls*, fibre, surface morphology, characterizations.

Comparative study of microwave-assisted and traditional extractions of polysaccharides from Swiss chard: Structural characterizations and hepatoprotective potentials evaluation

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[c)] Normandie University, UNIROUEN, INSA Rouen, CNRS, PBS, 76000 Rouen, France.

Conventional extraction methods for polysaccharides were energy consuming, laborious and time-consuming. Microwave-assisted extraction (MAE) was employed for the isolation of polysaccharides from *Beta vulgaris* (PBV_{MAE}). The extracting parameters were optimized adopting response surface methodology. The highest polysaccharide yield (13,42%), which is in concordance with the predicted value (13,38%), was obtained under the following conditions: extraction time 176 s, liquid–solid ratio of 33:1 (mL/g) and power of 422 W. Colorimetric assays showed that total sugar and uronic acid contents for polysaccharide were 77.58% and 51.50%, respectively. Furthermore, physico-chemical characterizations methods including FT-IR, NMR, DSC and UV-vis analysis were performed. Moreover, GC-MS analyzes showed that PBV_{MAE} was a pectic polysaccharide which formed of arabinose, mannose, galactose, rhamnose, glucose and xylose in the molar percentage of 65.38%, 3.87%, 13.17%, 5.41%, 7.03% and 4.39%, respectively. In microwave heating process, a sharp decrease in Mw was detected in SEC measurement. Furthermore, it showed stronger antioxidant activities compared with hot water extraction by evaluating in DPPH free radical and reducing power. Importantly, PBV_{MAE} exerted a potent hepatoprotective effect against Cd-caused oxidative stress in liver rats. This data revealed that the molecular weights played a more important role in antioxidant activities.

Key words: Chard carbohydrates; Microwave-assisted extraction; Box–Behnken design; Physico-chemical characterizations; hepatocytotoxicity.

DEVELOPMENT OF MELATONIN EMBEDDED PLGA-PEG6000 NANOFIBER BIOMATERIAL, AND INVESTIGATION OF THE EFFECTS ON ABDOMINAL ADHESION FORMATION[*]

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Postoperative abdominal adhesion (AD) following surgery remains in one of five patients after most abdominal surgeries. Due to the advances in surgical technique, the significant morbidity and cost of adhesion-related disorders still to be highly prevalent. Although various methods have been improved to reduce the abdominal adhesions, a gold standart method still doesn’t exist. In the present study, it was aimed to investigate the effects of Poly(D,L-lactide-co-glycolide)-PEG6000 Nanofiber+Melatonin on abdominal adhesion model in rats. For this purpose, Poly(D,L-lactide-co-glycolide)-PEG6000 Nanofiber+Melatonin matrix was produced and release profiling was performed in vitro. Animal procedure was carried out with 18 Wistar male rats. Rats were divided into three groups as follows; Sham, Matrix, Mel+Matrix, respectively. Following release profiling in vitro, adhesion model was created in rats and prepared matrix (2x2 cm, 0.25 mg melatonin/per matrix) applicated to injury area. On post-op 21th day, under general anesthesia, intra-abdominal adhesion scores were determined. Then, caecum, peritoneal tissue and adhesive bands harvested from rats. For evaluation of melatonin riched matrix effect, macroscopic and histopathological investigation was performed. Our results indicated that Poly(D,L-lactide-co-glycolide)-PEG6000 Nanofiber+Melatonin matrix was degraded completely in rat abdominal cavity and significantly reduced adhesion bands compared to other groups ($p<0.05$).

Key Words: Tissue Adhesions, Melatonin, PLGA, Biocompatible Materials

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New impedancemetric biosensors for rare earth element detection

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For years, special attention has been given to the use of bio-sourced materials instead of fossil fuels. Among these natural resources are dianhydrohexitols.

A new bi-functional oligo (ether-sulfone) based on isosorbide has been studied for the detection of rare earth elements. These new poly (ether-sulfone) based phases have already shown an excellent adsorption efficiency towards phenolic molecules (90-100% of the adsorbed quantity reached after only 20 minutes of contact).

Based in our previous works[1], we apply the electrochemical impedance spectroscopy technique to detect Lanthanum element by using a bi-functional oligo (ether-sulfone) based on dianhydrohexitols.

Key words: Poly(ether sulfone), electrochemical impedance spectroscopy, detection, rare earth.

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Influence of in-situ metallization process with three amounts of Pt NPs on structural virtues and mechanical behaviors of the surfaces of the polyacrylonitrile nanofibers

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Here, a novel methodology to metalize the polyacrylonitrile, PAN, surface based on a loading of various amount of platinum nanoparticles "Pt NPs" (1 wt%, 7 wt% and 10 wt %) is reported with the intention of fashioning of a stable fibrous structure with the good structural specifications. The Pt NPs prepared by ultrasound irradiation assisted with a reducer system ($NaBH_4$/KOH). The physiochemical characterization of all fibrous samples was carried out by XRD and FT-IR, FESEM and AFM techniques. From crystalline assessments, the observed shift in the diffraction peaks of PAN $_{(1\,0\,0)}$ towards lower angles in the 1PtPAN and 7PtPAN samples, containing smaller-sized nanoparticles, are overt results of an improvement in the crystalline traits of the parent matrix. The strong interconnection/hydrogen bonds between both components explain not only the change of the crystalline properties of the matrix but also the homogeneous distribution and creation of a stable layer of the Pt NPs on the 0PtPAN surface, confirmed by the FESEM images and FT-IR technique. Study of mechanical properties showed that the loading of small spherical particles onto the PAN matric, in particular 1PtPAN and 7PtPAN samples, was positively reflected on the improvement of the mechanical performances with the best structural stability not in the 10PtPAN and 0PtPAN samples. These results is due to decreasing in crytallinity degree and increasing fiber diameter/particle size. As a result, the changes observed in the aforementioned measurements were reasonably regular and gradual for fibers with low Pt NPs content, while the same measurements were significantly deteriorated in the case of fibers with higher Pt NPs contents.

Keywords : Metalized nanofibers, Platinum nanoparticles, structural properties, mechanical properties, Metallization

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Novel Oleanolic acid-Isoindolinones bearing 1,2,3-triazole moieties as potential antibacterial agents: Design and synthesis

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Oleanolic acid (OA) [1], a naturally occurring hydroxy pentacyclic triterpenoid that abound in the industrial olive-oil waste, has been reported several times for its interesting biological activities. In this work, a series of structurally novel 1,2,3-triazole-tethered OA-isoindolinones hybrids were designed and synthesized with good yields (70 - 98%) by means of click chemistry-mediated fusion between C-3 modified OA and different isoindolinones [2]. To that end a Cu(I)-catalyzed azide alkyne Huisgen 1,3-cycloaddition was used. The targeted compounds were evaluated *in vitro* for their antibacterial activity [3]. Promising results were demonstrated against specific strains.

Key words: Oleanolic acid, Isoindolinones, Triazole, Click chemistry, Antibacterial activity.

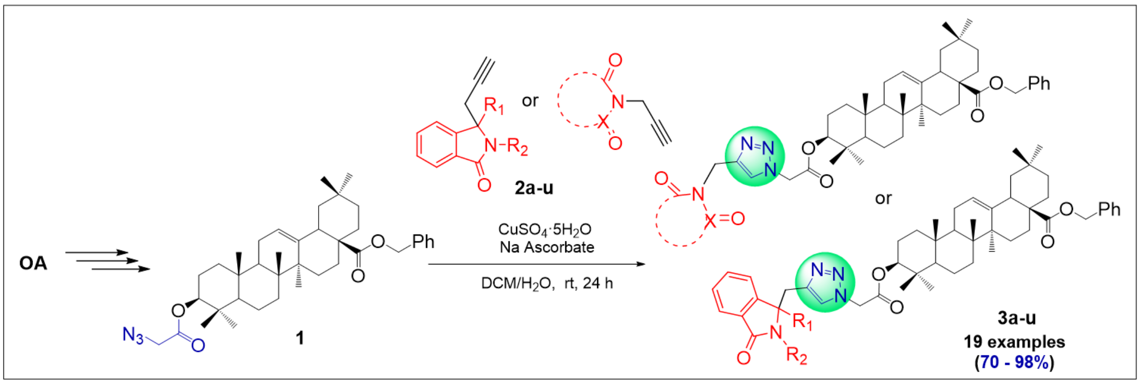

Figure 1. Semi-synthesis of novel 1,2,3 triazole-substituted oleanolic acid derivatives

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Synthesis of N -Heterocyclic carbene-palladium-PEPPSI complexes and their catalytic activity in the direct C-H bond activation

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The palladium-catalyzed direct arylation of various heteroaromatics including pyrroles by a C–H bond activation using aryl halides has met great success in recent years, allowing the synthesis of a wide variety of arylated heteroaromatics in only one step [1]. Since these exciting results, the palladium-catalyzed direct arylation of various heteroaromatics with aryl halides has proved to be a powerful method for the synthesis of a wide variety of arylated heterocycles [2]. it's a valuable method for the formation of C(sp2)– C(sp2) bonds in contemporary organic synthesis, because of the numerous applications of heteroaromatic compounds as biologically active compounds and functional materials[3]. For this reason, we synthesized a series of new palladium-NHC-PEPPSI complexes. These compounds were characterized by ^{1}H and ^{13}C NMR spectroscopy and IR spectroscopy. We then examined the activity of the PEPPSI type palladium–NHC complexes in the direct arylation of styrene, with various aryl bromides as coupling partners.

Key words: palladium, N-heterocyclic carbenes, C-H bond activation, arylation.

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Synthesis, spectroscopic characterization and antioxidant evaluation of novel trisubstituted cyclohexenones

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Natural compounds bearing α,β-unsaturated carbonyl moiety, such as polyphenols, chalcones and flavonoids have shown a promising anticancer activity [1]. In addition, natural chalcones and flavonoids as well as their synthetic analogues, exhibit strong antioxidant activity [2].
Furthermore, the presence of the α,β-unsaturated carbonyl system in the molecular backbone is known to be responsible for a wide range of pharmacological activities of several molecules [3]. Therefore, the styryl group (Ph-CH=CH-R) is widely represented in medically important compounds, including drugs, clinical candidates, and molecular probes, as it has a positive impact on lipophilicity, oral absorption, and biological activity [4].

Our research works, aim to investigate the high reactivity of dibenzylideneacetone (DBA) derivatives as Michael acceptors towards activated methylene's. Herein, we describe the action of ethyl acetoacetate on DBA in order to synthesize a series of trisubstituted cyclohexenones incorporating a styryl moiety. The structures of the obtained compounds have been confirmed by the usual spectroscopic methods namely ^{1}H NMR, ^{13}C NMR, IR and HRMS.

Keywords: Dibenzylideneacetone, activated methylene, ethyl acetoacetate, Michael addition, cyclohexenone.

Acknowledgements: authors are thankful to the "Agence Universitaire de la Francophone (AUF)" for financial support (Reference: DRM-6588).

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Semisynthesis and spectroscopic characterization of new isoxazolic heterocycles based atlantones isolated from *Cedrus atlantica* essential oil

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The 1,3-dipolar cycloaddition reaction has been always considered as one of the main routes used to synthesize pentagonal heterocyclic systems, such as isoxazole[1,2], pyrazole[3] and triazole[4]. These heterocyclic compounds are of great interest due to their large array of applications in various domains[5]. Moreover, natural heterocycle compounds in particular those bearing isoxazoline moiety present a wide range of biological activities, such as: anticancer[6], analgesic and anti-inflammatory[7] activities.

In the present work, we envisaged to study the 1,3-dipolar cycloaddition reaction of nitrile oxides and atlantones isolated from *Cedrus atlantica* essential oil[8]. The regio- and chemoselectivity of the reaction were also discussed. The structures of the obtained cycloadducts were established using usual spectroscopic methods: IR, NMR (^{1}H and ^{13}C) and HRMS. The obtained cycloadducts were also investigated for their antibacterial and antioxidant activities.

Keywords: *Cedrus atlantica*, atlantones, 1,3-dipolar cycloaddition, regioselectivity, antibacterial, antioxidant.

Acknowledgment: this work is support by "Agence Universitaire de la Francophone AUF" under DRM-6588 project.

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Mirabegron Loaded Transdermal Patch For Over Active Bladder

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Nowadays, an overactive bladder is one of the most important diseases in the world. Traditional methods used in the treatment of this disease may be insufficient. Controlled release of drug active ingredients is an important solution to increase the effect of drugs that can be used for treatment. Transdermal patch systems is used to deliver a specific dose of medicines across the skin and into bloodstream without gastrointestinal adverse effects which in the case of oral usage of drugs.

It is certain that the controlled release of Mirabegron, which is one of the most used active substances in the treatment of this disease, provides a positive effect on the treatment. In this study, the layer of the transdermal patch was prepared with a backing film, an adhesive as a drug reservoir, and a layer. Mirabegron was loaded into the transdermal patch and its release kinetics had been examined. Transdermal patches were cut 3 × 5 cm pieces with containing 9 mg and 19 mg Mirabegron and release kinetics in PBS were investigated. The surface morphology behavior was carried out by an SEM. Also, FTIR analysis was performed for the chemical structure of the drug-loaded patch.

Keywords: Transdermal Patch, Over Active Bladder, Mirabegron

Acknowledgement: This work was supported by Çanakkale Onsekiz Mart University Scientific Research Coordination Unit. Project number: FBA-2022-3896

Exploring regioselective 1,3-dipolar cycloaddition in the vinyl-triazole series: A straightforward approach to bis-heterocycles

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We unveil the synthesis of novel bis-heterocycles based on 1,2,4-triazoles and isoxazolidines, two of the most significant scaffolds in medicinal chemistry [1,2]. These bis-heterocyclic compounds, which consist of two five-membered poly-heteroatomic rings linked together by a Csp^2-Csp^3 bond, have been identified in numerous natural products and pharmaceuticals, highlighting their biological significance [3,4]. Our innovative approach focuses on the efficient and straightforward synthesis of these compounds using 1,3-dipolar cycloaddition reactions between 5-vinyl-1,2,4-triazole and nitrone derivatives, allowing the creation of a diverse range of potential drug candidates. To further explain the reactions' behaviors, we will also present a theoretical study that illustrates the regioselectivity of this process. Our findings have significant implications for the design and synthesis of novel triazolylisoxazolidines with potential applications in drug development. Theoretical DFT calculations were performed to analyze the local reactivity of different sites, as well as the kinetic and thermodynamic stability of the desired products. The data from IRC calculations showed close results to the experiment.

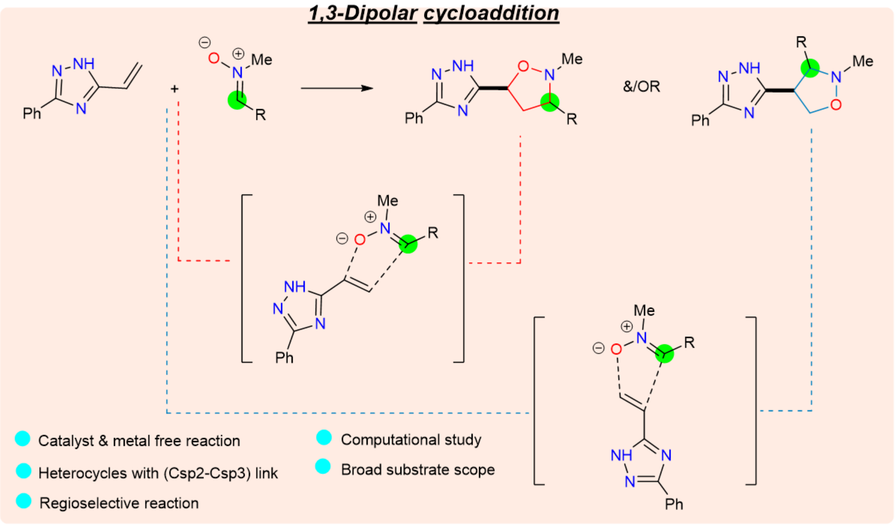

Figure 1. Synthesis of new 1,2,4-triazolylisoxazolidine-based bis-heterocycles.

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Hepatoprotective effect against cadmium-induced liver toxicity in rats of *Foeniculum vulgare* seed polysaccharides

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Foeniculum vulgare (*F. vulgare*) is a known herbal spice, and its seed are very popular worldwide and extensively used in culinary and therapeutic fields. In this present investigation, polysaccharides from *F. vulgare* seed were characterized using FT-IR, UV–vis, NMR, GC-MS and SEC/MALS/DRI analysis [1]. *F. vulgare* seed polysaccharides (FPS) was composed of galactose, glucose, arabinose, mannose, xylose, fructose and rhamnose in molar percentage of 20.4%, 55.8%, 5.3%, 13.6%, 2.1%, 1.5% and 1.3 %, respectively with a weight average molecular weight of 101 000 g/mol. The extracted FPS revealed an interesting antioxidant activity. Further, FPS, significantly hindered cadmium-induced oxidation damage and applied a protective effect on hepatotoxicity of cadmium, with a significant reduction in malondialdehyde (MDA) production and interesting levels of superoxide dismutase (SOD) and catalase (CAT) enzymes. Overall results suggest that FPS is a promising natural antioxidant for the treatment of hepatic disease.

Key words: *Foeniculum vulgare* seed, polysaccharides, physicochemical characterization, hepatocytotoxicity, antioxidant properties.

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New 2,4-bis(arylethynyl)-9-chloro-5,6,7,8-tetrahydroacridines, synthesis and photo-physical properties investigation

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Acridine derivatives have attracted considerable interest in numerous areas owing to their interesting physical and chemical properties. Herein, starting from readily available anthranilic acid, an efficient synthesis of new 2,4-bis(2-arylethynyl)-9-chloro-5,6,7,8-tetrahydroacridines was accomplished. Aiming to expand π-conjugation in tetrahydroacridine core, diverse aryl ethynyl groups were incorporated at C-2 and C-4 positions using the Sonogashira cross-coupling. Experimental conditions including: Solvent, catalyst concentration, temperature and base were optimized. Besides, the chemoselectivity as well as the regioselectivity of the reaction were studied. The Photo-physical properties of synthesized tetrahydroacridine derivatives have been examined in diluted dichloromethane solutions by UV-visible absorption, emission spectroscopy and DFT calculations were carried out. They showed remarkable behavior owing to their extended π-conjugated structures. The obtained results indicated that the substrates at external phenyls could communicate electronically with acridine nucleus via the ethynyl groups and affected significantly the photo-physical proprieties of the prepared molecules. The new tetrahydroacridines synthesized in this current study could constitute a good luminescent candidate for organic electronic uses.

Keywords: Acridine, Cross-Coupling, Palladium, Fluorescence.

Synthesis and Catalytic Hydrogenation Activity of Ruthenium-Arene Complexes Featuring Aldiminium and 1,2,3-Triazolium Dithiocarboxylate Zwitterions

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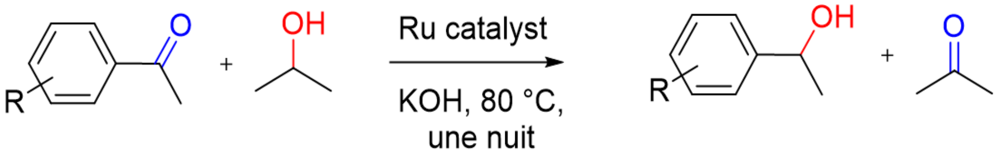
Following previous investigations from our laboratory on azolium-2-dithiocarboxylates betaines derived from N-heterocyclic carbenes [1], a series of three aldiminium and six 1,2,3-triazolium dithiocarboxylates zwitterions derived, respectively, from cyclic(alkyl)(amino) and mesoionic carbenes were synthesized [2] along with their corresponding Ruthenium-arene complexes (Scheme 1). These complexes were then evaluated for their catalytic activity in the reaction of transfer hydrogenation of ketones.



Scheme1. Transfer Hydrogenation reaction catalyzed by Ruthenium-arene complexes.

Key words: Azolium-2 dithiocarboxylates zwitterions, N-heterocyclic carbenes, Ruthenium-arene complexes, Transfer hydrogenation, ketones.

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Amidation of carboxylic acids with amines in heterogeneous phase

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Amide bonds constitute the building blocks of different pharmaceutical and biologically-active compounds. Conventionally, amides are obtained in homogeneous phase using amines and carboxylic acid derivatives (anhydrides or acyl chlorides) or via the in-situ activation of carboxylic acid with stoichiometric amounts of a condensation agent [1]. The conventional method suffers from low atom efficiency and the formation of by-products. On the contrary, the main advantage of heterogeneous catalysis is the possibility of facile separation of the catalyst from the reaction medium [2].

The aim of this study is the evaluation of the catalytic behaviour of molybdenum precursors in the conversion of carboxylic acids and amines into amides in green condition. According to the results compiled in Table 1, the amidation reaction could be successfully performed at 120 °C without solvent using very low amounts of Mo.

Table 1: Catalytic behaviour of a molybdenum precursor in amidation

Reaction mixture	**Yield (%)***
Benzoic acid + aniline + 2 mol. % of Mo precursor	51
Benzoic acid + aniline + 4 mol. % of Mo precursor	33
Benzoic acid + *p*-toluidine + 8.7 mol. % of Mo precursor	100
Benzoic acid + 2,3-xylidine + 8.7 mol. % of Mo precursor	69
Propionic acid + aniline + 8.7 mol. % of Mo precursor	66
Salicylic acid + aniline + 8.7 mol. % of Mo precursor	25
Isocrotonic acid + aniline + 8.7 mol. % of Mo precursor	Inactive

* T = 120 °C, *t* = 20 hours

Moreover, molybdenum exchanged zeolites catalyzed the amidation reaction with significant yields. The use of such heterogeneous catalysts offers the advantage of a potential recyclability and a better atom economy.

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Chemical and Fatty Acid Composition of Crude and Purified Extracts Obtained from Datura innoxia Seeds Extracted with Different Solvents

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Oils play a key role as raw materials in a variety of industries. The aim of this study was to evaluate the potential of Datura innoxia seed oil cultivated in Tunisia for industrial purpose and to study the effects of hexane, chloroform, and isopropanol as extraction solvents on the compositions of the extracts. The results showed that the hexane and chloroform extracts were mainly neutral oils which were rich in linoleic (≈ 46%) and oleic (≈ 31%) acids. However, the isopropanol extract contained large amount of neutral oil and organic acids. Neutral oil contained mainly palmitic acid (40.2%) and some important and valuable epoxy (15.4%) and cyclopropane (13.2%) fatty acids. Analysis of the sterol and tocopherol levels of the crude and purified oil extracted revealed that they were significantly affected by the extraction solvent used.

Key words: seed oil, extraction, tocopherol

Design and hemisynthesis of new eugenol derivatives and evaluation of their biological properties

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Medicinal chemistry plays an important role in the discovery of new biologically active molecules. Overall, the bioactivity of molecules is highly correlated to their electronic and structure properties.

Eugenol is a natural aromatic compound widely present in cloves (*Syzygium aromaticum*) and known for its therapeutic benefits [1-2]. It has also shown strong reactivity towards various electrophilic and nucleophilic reagents [3-6].

Considering the aforementioned interest of eugenol, we considered in this work to study the reactivity of eugenol in the aims to synthesize a series of eugenol derivatives with potential pharmacological effects. The structures of the synthesized compounds were established on the basis of their IR, NMR (^{1}H & ^{13}C) and HRMS spectral data. In addition, the synthesized products were evaluated in vitro for their antibacterial and antioxidant activities.

Keywords: Eugenol, IR, NMR, HRMS, antibacterial, antioxidant, FRAP, DPPH.

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Highly selective turn-on florescent chemosensor for the detection of Cr (III) ion in drinking water

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An effective and simple carbazole-based Schiff base (CrbPy2) chemosensor for selective recognition of Cr(III) was designed and synthesized. The molecular structure of CrbPy2 was confirmed by NMR and FT-IR spectroscopies, its crystal structure was investigated by XRD analysis and the results were in good agreement with the DFT calculations. The CrbPy2 probe showed high selectivity toward Cr^{3+} ions in THF/H2O (95/5%) solution. Adding Cr^{3+} ions to CrbPy2 dilute solution induced a naked eye color change from colorless to yellow accompanied with a florescence turn-on. The proposed sensing mechanism was related to chelation-enhanced florescence (CHEF) process. The stoichiometry ratio of CrbPy2-Cr^{3+} complex is 1:1 with an association constant exceeding 3×10^5 M^{-1}. The study of the sensing properties in different pH showed that CrbPy2 can tolerate the detection of Cr^{3+} ions in a pH range from 6 to 8. The chelating sites of the chemosensor and the coordination geometry of the complex were determined using 1H NMR titrations and MEP calculations. The detection was completed within 2–3 min and the detection limit reaches 1.08 μM. The linear recognition range of Cr (III) is from 1.08 μM to 4 μM making CrbPy2 a suitable probe for real-time identification of unsafe Cr^{3+} concentration in drinking water.

Gamma-ray irradiation-induced variations in structural and electrical properties of PVP neutral polymer in water

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The purpose of this study was to improve polyvinylpyrrolidone (PVP) electrical conductivity by means of gamma irradiation for a dosimetric application. PVP was irradiated with various doses of γ radiation and dissolved in water to investigate its structural, optical, and electrical characteristics. Electron paramagnetic resonance measurements (EPR) depicted the presence of free radical (H·). FTIR and UV–visible spectra revealed a structural deformation in the post-irradiated polymer (PVP*) through chain scission. In addition, the gap and Urbach energy were investigated and discussed. The obtained results of electrical conductivity show an exponential behaviour indicating a character of a pseudo-polyelctrolyte. The pH measurements revealed an acidic character of PVP*.

Keywords: Polyvinylpyrrolidone, Gamma irradiation, Electrical conductivity

A new truxene-based triazole-linked porous polymer for efficient removal of dyes from water by a synergistic adsorption/photodegradation approach

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Conjugated microporous organic materials, porous networks composed of covalently linked π-conjugated molecular units, have emerged as a new type of porous materials with applications in fields such as adsorption, separation, catalysis, sensing, energy storage, biological applications... These applications benefit from the high stability and large surface area that characterize such polymers, but also from the enormous chemical flexibility in the molecular design of conjugated scaffolds, which offers unlimited possibilities for tuning the pore structure, morphology, and functionality of the final materials through the appropriate choice of π-conjugated building blocks. In this communication, a new porous polymer (Tx-Tri) was synthesized from semiconducting truxene units linked via triazole nodes by Cu(I)-catalyzed azide-alkyne click polymerization. This material exhibits a high adsorption capacity for cationic dyes, particularly Nile blue, likely due to their persistent porosity combined with the high tendency of triazole groups to form intramolecular interactions. Interestingly, the Tx-Tri polymer also act as photocatalysts in oxidative degradation, allowing easy recovery for dyes. These properties make these materials interesting candidates for water treatment by synergistic adsorption/photodegradation processes.

DEVELOPMENT OF SELECTIVE EXTRACTION PROCESS OF HYDROXYTYROSOL FROM OLIVE TREE BY-PRODUCTS

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Nowadays, the consumption of virgin olive oil, a key component of the Mediterranean diet, is recommended as protection for people with chronic diseases. It also has many beneficial effects for healthy people [1]. These significant beneficial effects are attributed to its phenolic constituents and fatty acid composition [2]. One of the phenolic compounds is hydroxytyrosol (4-(2-Hydroxyethyl)-1,2-benzenediol), a molecule with antioxidant activity [3]. Hydroxytyrosol is derived from the hydrolysis of oleuropein during olive ripening [4]. It can be extracted from olive by-products, stable in its free form and easily penetrates into tissues [5]. In this context, we were interested in developing a new eco-responsible method to extract hydroxytyrosol from olive by-products, especially leaves. To do this, we made a comparison between a conventional method (thermal extraction) and a non-conventional method (microwave extraction). The presence of phenols, flavonoids and flavanols in olive leaves was first evaluated, both by conventional method (respectively 277,7 mg EAG/g, 75,3 mg EQ/g and 26,6 mg ER/g) and by non-conventional method (269,8 mg EAG/g, 83,8 mg EQ/g and 30,8 mg ER/g). The second part of the study focused on hydroxytyrosol, the phenolic compound of interest. The HPLC assay showed a high content in the leaf extract (0,3 % which corresponds to 302,4 mg hydroxytyrosol/g) by conventional thermal method and 0,34% (346,3 mg hydroxytyrosol/g) by extraction under microwave irradiation. The first results of the microwave extraction are interesting, valorizing the olive leaves as a potential source of natural biochemical compounds with wide applications in the cosmetic, food and pharmaceutical industries.

Keywords: Hydroxytyrosol, biomass valorization, olive by-products, bioactives, extraction, phenols**.**

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Random polydepsipeptides based on Phenylalanine and ε-caprolactone by direct melt copolymerization

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A series of phenylalanine-ε-caprolactone-based polydepsipeptides (PPC)s were synthesized by melt polycondensation with a wide range of molar compositions. Their structure is discussed on the basis of in-depth nuclear magnetic resonance and infrared spectroscopy analyses. The resulting copolymers are completely amorphous for ε-caprolactone (CL) contents lower than 80%, while copolymers with CL composition above 80% are semi-crystalline. These (PPC)s present increasing glass transition temperatures at increasing amino acids contents and exhibit fairly good thermal stability. Owing to their physicochemical characteristics, these copolymers might be of great interest for biomedical applications.

Keywords: Polydepsipeptides, Phenylalanine, ε-Caprolactone, Melt polycondensation.

Toward sustainable phenolic resins from biobased aldehydes using spark plasma sintering

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Phenolic resins are an attractive family thermoset materials. However, there are some concerns related to the highly toxic nature of formaldehyde and phenol, main building blocks of phenolic resins. Herein, a sustainable alternative method is proposed to synthesize fully biobased and non-harmful resoles based on the condensation of resorcinol (**R**) with 4-four different aldehydes under alkaline conditions. Two aldehyde-based building blocks including: 5-methylfurfural (**MFu**) and cinnamaldehyde (**C**), obtained from biobased, renewable and abundant resources were successfully reacted with resorcinol, with the aim of providing more sustainable and environmental-friendly alternatives to the current commercially available and hazardous phenol-formaldehyde resins. Two molar ratios of basic catalyst (HO^-)/(R) were considered to study their effect on the prepolymerization reaction and on the thermo-mechanical properties of the final materials. The thermal decomposition behavior of the cured resoles was investigated by thermogravimetric analysis (TGA), showing extremely high degradation temperatures and high char yields (up to 60%). Furthermore, the resoles also exhibited high chemical resistance with insoluble fractions (IF) up to 80%. Finally, and to study the mechanical properties of the obtained resoles, the fully crosslinked resoles were consolidated using the spark plasma sintering (SPS) technique. The micro-structures of the sintered resoles were investigated by scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS). Compression tests were also conducted to evaluate the mechanical resistance of cured resoles. Compression moduli and strength (up to 1.25 GPa and, 74 MPa respectively) were observed for the cured resoles. Pyrolysis combustion flow calorimeter analysis (PCFC) revealed that MFu has a very low flammability character, demonstrated with a peak of heat release (pHRR) around 17 W/g and the total heat release (THR) 2.5 kJ/g. Overall, it was demonstrated that **MFu** as a non-toxic, biobased, and inexpensive aldehyde can be advantageously used in the preparation of more sustainable phenolic resin.

Keywords: Phenolic resin; Resorcinol; Biobased aldehyde; Sustainability; Spark Plasma Sintering

Program of
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2023

Biological activities of essential oils of *Eucalyptus camaldulensis*, in combination with the essential oils of *Cupressus sempervirens*

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Specific studies of binary mixtures of essential oils of *Eucalyptus camaldulensis* and *Cupressus sempervirens* have been carried out. Three binary combinations formed (Mixture **M1** (75:25); Mixture **M2** (50:50) and Mixture **M3** (25:75)) in mass percentage of essential oils were analyzed by GC/MS in order to determine the impact of the mixtures on the variability of the chemical composition. Also, it was investigated their *synergistic* effect in mean of their biological activities. The mixtures essential oils were dominated by hydrocarbon monoterpenes. **M1** contained mainly O-cymene (25.42 %), followed by α-pinene (17.91 %), Eucalyptol (13.57 %) and Spathulenol (9.76%) whereas the **M2** was dominated by α-pinene (30.24 %), O-cymene (16.21 %), Eucalyptol (11.29 %) and δ-3-Carene (9.98 %). Those of **M3** were α-pinene (45.68 %), δ-3-Carene (16.33 %), O-cymene (8.93 %) and Eucalyptol (5.24 %). The antioxidant activity of the three mixtures of essential oil was evaluated using the DPPH test. The antioxidant powers of blend M1 (75:25) are considered the strongest. This study also concluded that **M2** has a slightly lower antioxidant power than **M1**, while **M3** prove no antioxidant power. The screening of the antibacterial activity of the binary mixtures was carried out against a range of four bacterial strains according to the method of diffusion in agar medium. **M1**, **M2** and **M3** mixtures do not evoke efficacy against the range of strains tested. Mixed *Eucalyptus camaldulensis* and *Cupressus sempervirens* EOs had contact toxic effect and repulsive effect against *Sitophilus granarius* adults and this effect was evident at 4 µL.mL^{-1} dose. The lethal dose (LD50) for wheat weevil was determined as 5.38 µL.mL^{-1} mixture of 75% *Cupressus sempervirens* and 25% *Eucalyptus camaldulensis* EOs. LD50 was calculated only for this mixture as 100% mortality could not be reached at other mixing ratios.

Keywords: antioxidant, antibacterial activity, Essential oil, *Cupressus sempervirens*, *Eucalyptus camaldulensis*, *Sitophilus granarius*, mortality, repulsive effect

Green synthesis of copper oxide nanoparticles (CuO NPs) from *salvia officinalis* leaf extract: Removal of Rhodamine B and Box-Behnken design

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In the present study copper oxide nanoparticles (CuO-NPs) were synthesized via simple and eco-friendly green route using leaf extract of *salvia officinalis* as a reducing and capping agent. The results of scanning electron microscopy (SEM) and dynamic light scattering (DLS) revealed that the green synthesized copper oxide nanoparticles are spherical and have a mean particle size of 30 nm, with a negative zeta potential of -17.9 mV. The XRD graph showed the crystalline and monoclinic phases of CuO nanoparticles. The average size of the nanomaterial was estimated as 25-30 nm by using the Scherrer's formula. The adsorption characteristics of the nano-adsorbents were investigated using Rhodamine B. The experimental parameters such as pH solution (A: 2 - 10), adsorbing dose (B: 30 - 70 mg), [RhB] dye concentration (C: 10 - 30 mg/L), were optimized through Box–Behnken Design (BBD) of response surface methodology for the optimum response. The adsorption equilibrium data was well fitted to Freundlich isotherm model and the kinetics was explained through pseudo-second-order kinetic model. The overall process was feasible, spontaneous and exothermic. Linear approach for analysing the isotherm as well as kinetic parameters was found more appropriate than the non-linear approach. The adsorbent was successfully regenerated and reused up to five consecutive cycles without significant loss in removal capacity. The experimental results exhibited that CuO-NPs can be a good alternative for Rhodamine B removal from aqueous solutions.

Keywords: Nanoparticles, adsorption, *salvia officinalis*, Copper oxide, green synthesis, optimization, BBD

Polyol synthesis of copper-doped ZnO nanorods for photocatalytic degradation of Diuron herbicide under simulated solar light.

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Copper doped ZnO nanorods have been synthetized using a one-pot polyol method with low Cu molar content ($0 < x < 0.373\%$) and have been evaluated in the photodegradation of Diuron, one of the most highly toxic and persistent herbicides in water ecosystems. Triethylene-glycol (TREG) polyol solvent plays an important role as reducing and a stabilizing agent in controlling the morphology, size and photocatalytic activity of $Zn_{1-x}Cu_xO$ photocatalysts. The lightly doped ZnO nanomaterials have been characterized by X-ray diffraction, transmission electron microscopy, N2 adsorption study, inductively coupled plasma optical emission spectroscopy and UV–Vis diffuse reflectance spectroscopy. Such $Zn_{1-x}Cu_xO$ nanorods photocatalysts with optimized $x=0.047\%$ Cu content exhibit 9 times much higher photocatalytic activity than undoped ZnO nanorods under solar light illumination, and is attributed to higher charge separation rates for the photo-generated carriers in the $Zn_{1-x}Cu_xO$ nanorods structure.

A Facile approach for the synthesis of hematite and magnetite nanoparticles using starch for the removal of methylene blue from aqueous solution

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The aim of this work is to fabricate hematite and magnetite nanoparticles by the sol-gel-combustion method with different ratios (Φ) in which starch was used as the green fuel at low temperature and evaluate the efficiencies of magnetite nanoparticles for the removal of methylene blue from aqueous solution. The crystal structure, morphology, and specific surface area of the iron oxide nanoparticles were found to be dependent on the starch content. The formation of α-Fe_2O_3 and Fe_3O_4 NPs was confirmed by a range of spectroscopy and microscopy techniques such as powder X-ray diffraction (XRD), Fourier transform infrared spectroscopy, field emission-scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM) and vibrating sample magnetometer. The spectroscopic results indicated the successful formation of Fe_3O_4 NPs. FE-SEM and TEM images of Fe_3O_4 NPs revealed the spherical shape with particle size of 35 nm. Green synthesized Fe_3O_4 NPs show a mesoporous structure and a stronger ferromagnetic property at room temperature, which enhanced adsorption efficiency toward MB from contaminated water. The experimental kinetic data fitted very well with the pseudo-second-order model. The adsorption isotherm data fitted well to Langmuir isotherm and it implies that the adsorption of MB on Fe_3O_4 NPs is chemisorptions.

Bioactive secondary metabolites from Rwandese medicinal plants

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Plants have served as the principal source of medicines in all parts of the world through the ages. Herbal medicines have been used as decoctions, infusions, tinctures or single substance drugs. Due to their impressive ability of diversification, plants have also served as sources of inspiration for synthetic chemists in the urge of preparing new molecules for diverse applications.

In our search for bioactive compounds, we identified the secondary metabolites of *Eucalyptus melliodora*, *Eucalyptus anceps*, *Eriosema montanum*, *Clerodendrum myricoide*s, and *Senecio mannii*, a selection of Rwandese medicinal plants, and assayed them for their antifungal, antibacterial, antiviral, and cytotoxic activities. We used chromatographic, spectroscopic and spectrometric methods including GC, HPLC, UV, IR, XRD, NMR, and HRMS for the separation, purification, and structure elucidation of the plant constituents.

The essential oils of *E. melliodora* and *E. anceps* were shown to contain mono- and diterpenes, and their alcohol derivatives, which were evaluated for antifungal activity. The investigation of *E. montanum* afforded 20 compounds including two new prenylated dihydrochalcones. Three new and two known iridoid glycosides were isolated from *C. myricoides*. The phytochemical investigation of *S. mannii* afforded one new silphiperfolanol angelate ester, two new macrocyclic pyrrolizidine alkaloids, and five known secondary metabolites. The structural modification of 2-angeloyloxy-5,8-dihydroxypresilphiperfolane, yielded two new derivatives with rearranged ring system. The relative stereochemistry of senaetnine was determined by NAMFIS (combined NMR and computational) analysis.

The isolated new compounds were showed to possess useful biological activities, and may provide hits for drugs discovery.

Keywords: NMR, dihydrochalcones, iridoids, silphiperfolanol, pyrrolizidine alkaloids (PAs)

Crystal Structure, thermal study, vibrational and optical properties of a novel dinuclear Bismth(III) Iodide trimethylenedipyridine compound

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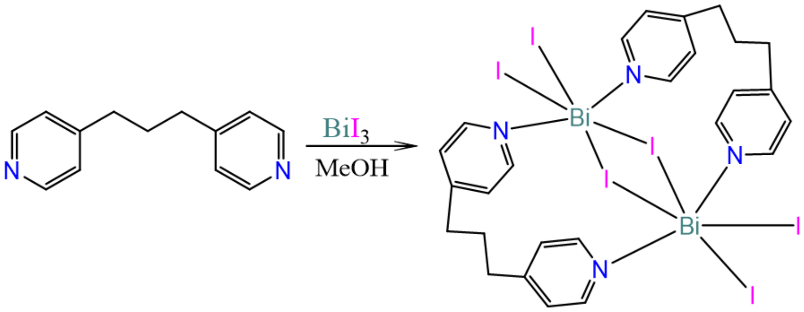
Bismuth-based materials have stimulated much interest due to their unique photoluminescence behavior. To date, several luminescent bismuth (III) complexes ligated by *N*-donor ligands have been investigated [1-3]. In this work, a new luminescent binuclear compound built from BiI_3 with a pyridine-type ligand, synthesized in MeOH solution and crystallized under slow evaporation method. This halide-bridged binuclear compound, which is also doubly bridged by 4,4'-trimethylenedipyridine, was characterized through single crystal X-ray diffraction at 100 K. Its thermal behavior was investigated via TGA-DTA, as well as its vibrational spectra by Infrared and Raman spectroscopy. Furthermore, the photoluminescence properties were examined through steady-state and time-dependent luminescence techniques.



Schema: Synthesis of Complex

Key words: Bismuth halide, N-donor ligand, luminescence, X-ray diffraction.

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Microwave assisted solvent free reactions of glycerol and ethylene glycol with benzaldehyde under Heterogeneous Catalysis: Mechanistic study

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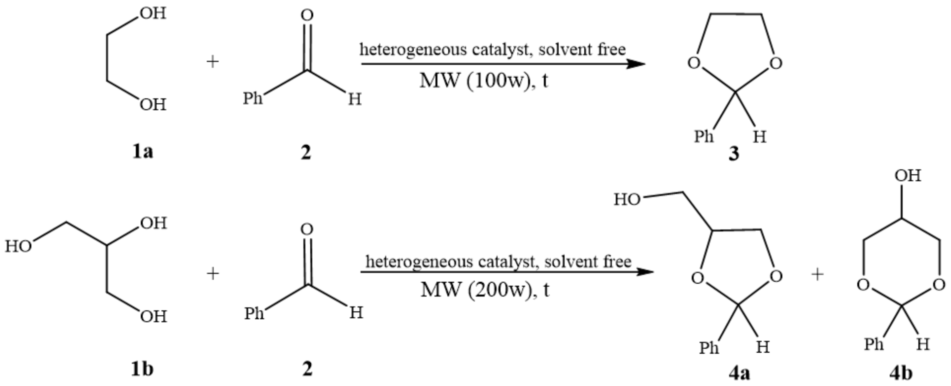
We demonstrated an unprecedented solvent-free protocol for the microwave-assisted acetalization of ethylene glycol **1a** and glycerol **1b** with benzaldehyde **2** to achieve high yields of the corresponding cyclic ketals. The structures of 1,3-dioxolane **3** and 1,3-dioxanes **4** derivatives compounds obtained are identified by NMR spectroscopic analysis (^{1}H NMR and ^{13}C NMR). The results confirm the green approach to valorizing glycerol and ethylene glycol. Considering the commercial importance of the acetalization reactions evidence for the high conversion and consistent selectivity.

A mechanistic study has been advanced to explain the formation of this heterocyclic catalyzed by bronsted and Lewis sites of silica gel, alumina and acid activated clay.



Scheme: Acetalization of ethylene glycol **1a** and glycerol **1b** with benzaldehyde **2** in the presence of heterogeneous catalyst.

Moreover, various heterogeneous catalysts based of silica and alumina on the acetalization reaction have also been screened.

Key words: Microwave chemistry, Acetalization, Glycerol, Ethylene glycol, catalysis.

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Abstracts of Poster Communications

Evaluation of the antioxidant and hemolytic activities of *Mentha spicata* L. harvested from region of El Oued in Algeria

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The objective of this study is to evaluate the antioxidant and hemolytic activities of the plant *Mentha spicata* L. The leaves of the *Mentha spicata* used were collected from the El Oued region. El Oued is located in the south-east of Algeria and characterized by an arid climate. *Mentha spicata* L. is a medicinal and aromatic herb. It belongs to the Lamiaceae family, subfamily *Neptoideae*. The aqueous extract of *Mentha spicata* L. has very important biological activities. Antioxidant and hemolytic activities of the aqueous extract were evaluated using: free radicals DPPH, ABTS, FRAP and hemolysis tests. The results obtained have shown that the aqueous extract of the leaves of *Mentha spicata* L. has important antioxidant and hemolytic activities due to the positive intervention of the region's climate (temperature). The results obtained were as follows: DPPH (IC_{50}=102.5 µg/mL), FRAP(IC_{50}= 289.5 µg/mL) and hemolysis (84.5%).

Key words: *Mentha spicata* L., antioxidant activity, hemolytic activity, aqueous extract.

Efficient synthesis of new morpholine compounds

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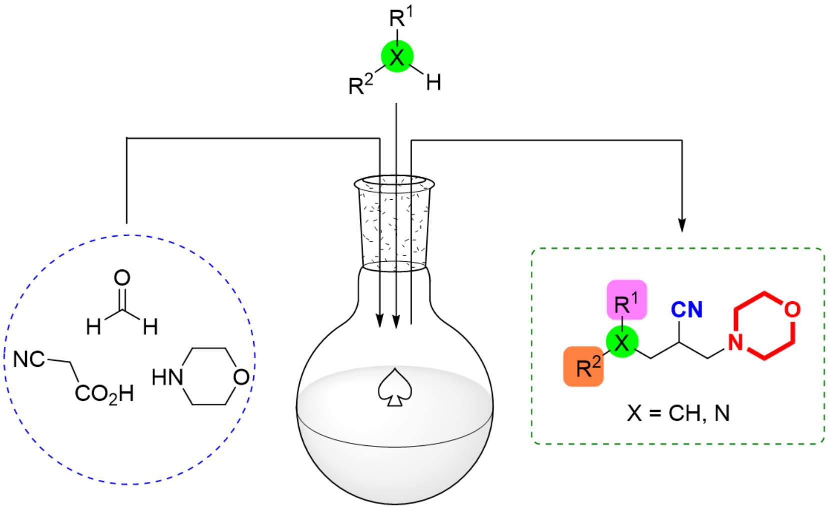
Morpholine-based structure compounds constitute a major group of natural compounds with various pharmacological effects.[1, 2] These group of compounds can be isolated from different plants and they can be synthesized through various chemical reactions.[3] The development of methodologies allowing the synthesis of a novel easily accessible morpholine compounds exhibiting functional groups remains a subject of interest. In this context, we describe the preparation of new morpholine derivatives bearing additional groups such as nitrile, phosphonate, ester and amine from easily available starting reagents following a reaction sequence of three-component condensation and Michael additions.



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Room Temperature Synthesis and Morphology Control of HKHST-1 Metal Organic Frameworks Materials

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It is generally believed that the chemical and physical properties of nanomaterials depend not only on their chemical composition but also on their structure, size, and morphology [1]. Indeed metal-organic frameworks (MOFs) are a new class of hybrid nanomaterials composed of metal ions bridged by organic ligands. Controlling the shape of MOFs is significant for maximizing their performances in various advanced applications. Several strategies have been developed for the controllable synthesis of MOFs.

In this work, we have demonstrated a simple strategy for reasonable control of Cu-based Metal Organic Frameworks HKUST-1 thin film morphology at room temperature. The investigation of the Cu /H3BTC molar ratio reveals that the different forms of fractal splitting growth were varied by only changing this parameter. The structural and morphological studies of obtained film were characterized using ATR-FTIR(IR), Fourier X-ray diffraction (XRD) and optical scanning electron microscopy.

Keywords: HKUST-1, Metal/Linkers molar ratio, Morphology.

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Sigmoid functions to characterize the collapse of Poly(N-isopropylacrylamide)

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The temperature effect of Poly(N-isopropylacrylamide) aqueous solution was investigated by turbidity and viscosity measurements. The experiments results confirm the thermo-sensitivity nature of the polymer. The absorbance variation of the prospected solutions and the intrinsic viscosity of the polymer show similar pattern under temperature effect. These observations confirm the coil to globule transition of the polymer. Several sigmoid functions are proposed to describe successfully the collapse of the thermo-sensitive polymer.

Keywords: Thermo-sensitive, absorbance, intrinsic viscosity, transition, Sigmoid

Quantification of electrophilicity parameter *E* of 4,6-Dinitro-2-(2’,4’,6’-trinitrophenyl)benzotriazole 1-Oxide

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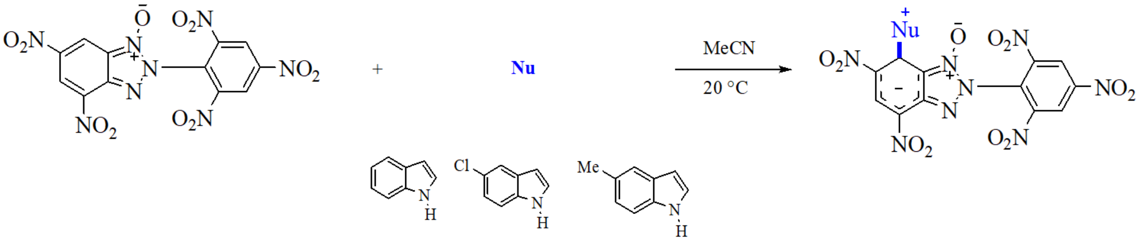
The kinetics of σ-complexation reactions of 4,6-dinitro-2-(2’,4’,6’-trinitrophenyl) benzotriazole 1-oxide with a series of indoles, have been studied by UV-visible in acetonitrile at 20 °C (Schema 1). According to the Mayr’s equation (1), the second order rate constant (log k_1) and the nucleophilicity parameters N and s_N of indoles correlated linearly, allowing us to determine the electrophilicity parameters E of this benzotriazole (E = -6.57) and to include them in the electrophilicity scale of Mayr. This result allowed for the remarkable ability of this electrophile to behave like a super-electrophhile.

$$\log k_1\ (20\ °C) = s_N\,(E + N) \qquad (1)$$



Scheme 1

Key words: Kinetics / σ-complexation / Electrophilicity / Nucleophilicity / Super-electrophile/ Mayr’s equation.

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Gelation and isoconversional kinetic analysis of synthesis of lignin-resorcinol-glyoxal resin curing

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Two resins were prepared from *Stipa tenacissima* L. and their physical and chemical behaviors were evaluated. The resins were produced by modification of extracted lignin from the *S. tenacissima* L. using phenolation reaction (resorcinol). Glyoxal and formaldehyde as cross-linking agents were employed to produce lignin–glyoxal resin and lignin-resorcinol-formaldehyde resins (LRFR), respectively. The curing process of two lignin-based resins (lignin–resorcinol–glyoxal, LRGR, and lignin–resorcinol–formaldehyde, LRFR) was studied by rheological measurements and differential scanning calorimetry (DSC) techniques, which showed that the gel formation obeys an isoconversional principle. In fact, an analysis on curing kinetics was performed by processing its non-isothermal DSC data using Ozawa's isoconversional methods and found that good fittings could be obtained. This method allowed the determination of activation energy and the pre-exponential factor dependencies on the degree of curing. In kinetics method, the variation in activation energy, evaluated at different curing degrees, revealed that the mechanism of phenolic resins is based on two reactions: methylolation followed by condensation. Finally, the gel points of these systems were found to be around 63 and 72 %, for LRFR and LRGR, respectively. These values were compared to those calculated from Flory and Stockmayer equation and found to be close to each other.

Key words: Lignin-resorcinol-glyoxal resins, Lignin-resorcinol-formaldehyde resins, Kinetics, DSC, Rheology, Gelation, Curing

Bis(μ-iodo)-tetrakis(*O*-methyl *N*-phenylthiocarbamate)-tetraiodo-dibismuth, the first example of a Bi(III) thiocarbamate compound

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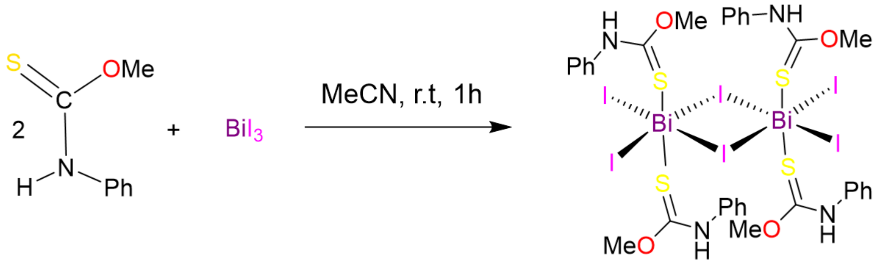
The complexation of thione ligand with BiX_3 has been received a great deal of interest in coordination chemistry due to their promising biological and pharmacological activity [1-3]. In the present study, we report the first example of dinuclear metal complex $[\{I_2Bi(\mu_2\text{-}I)_2BiI_2\}\{\kappa^1\text{-MeOC(=S)N(H)Ph}\}_4]$ **1** formed by the reaction of complexation of BiI_3 with two equivalents of *O*-methyl *N*-phenyl thiocarbamate **L** in MeCN solution (**Scheme 1**). The Compound **1** has characterized by IR, UV and NMR spectroscopy, The dinuclear framework has be ascertained by a single-crystal X-ray diffraction study performed at 100 K and has been studied by Hirshfeld surface analysis. The octahedral coordination sphere around each Bi atom is completed by two terminal iodide ligands with a mean Bi-I distance of 2.924(3) Å and two *trans*-arranged thiocarbamate ligands [4].



Scheme 1. Synthesis of the title compound **1**.

Keywords: Bismuth triiodide; thiocarbamate; thione X-ray diffraction, Hirshfeld surface analysis

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Synthesis and crystallographic characterization of the coordination polymers [{Cu(μ_2-I)$_2$Cu}(μ_2-ROC(=S)N(H)Ph)$_2$]$_n$ (R = Me, Et).

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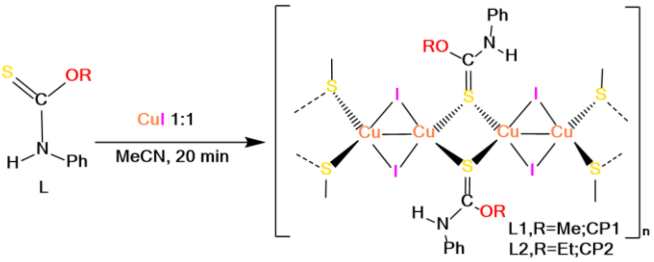
Over the years, serval metal complexes of thiocarbamates have been reported to play a significant role in the field of organometallics, extending their application to the medicinal and pharmaceutical fields. As a subclass, the group of Tiekink has recently reported a strategy for the synthesis of mononuclear complexes [(Ph_3P)$_2$Cu{ROC(=S)N(H)Ph}Cl] ,which could be beneficial in the development of future pharmocological compounds[1]. In continuation of that previous work, we were intrigued to study the reactivity of **L** (R= Me; **L1**R= Et; **L2**) with CuI in MeCN solution without PPh3 ligands. The characterization of both crystal of [{Cu(μ_2-I)$_2$Cu}(μ_2-**L**)$_2$]$_n$ **CP1** and **CP2** by X-ray diffraction analyses at 100 K confirmed that the formation of coordination polymers precedes the complexation by PPh_3. The molecular structures of **CP1** and **CP2** show that the unidimensional ribbons of **CP1** and **CP2** are interconnected through acentrosymmetric rhomboid-shaped {Cu(μ_2-I)$_2$Cu} units and through bridging **L** molecules.



Scheme 1. Synthesis of polymers [{Cu(μ_2-I)$_2$Cu}(μ_2-**L**)$_2$]$_n$ **(CP1,L1 ;CP2,L2)**

Keywords: copper halide, *O*-alkyl-*N*-phenylcarbamothioate, X-ray diffraction, coordination polymers

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Characteristics and chemical composition of solanum elaeagnifolium seed oil

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The physicochemical properties and the fatty acid composition of the oil extracted from *Solanum elaeagnifolium* seeds were evaluated and compared with conventional sunflower seed oil. The oil content of the *Solanum elaeagnifolium* seed oil was 7.12%. The main fatty acids in the oil were linoleic acid (63.4%) followed by oleic acid (20.8%), palmitic acid (9.8%), and stearic acid (3.9%). The saponification value (192.6 mg KOH/g), iodine value (130.7g/100 g of oil), peroxide value (50 mequiv. O_2/kg) and free fatty acid (9.6 mg KOH/g) were determined to assess the quality of the oil. Present study showed that this non-conventional *Solanum elaeagnifolium* seed oil can be used can be used for food and non-food applications to supplement or replace some of the conventional oils.

Keywords : solanum elaeagnifolium, seed oil, fatty acid composition

Fabrication, Characterization, In Vitro Release, and Some Biological Activities of Eucalyptus Essential Oil Loaded Poly (Lactic Acid) Nanofibers

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The objective of this work was to evaluate antibiofilm activity of *Eucalyptus camaldulensis* essential oil-loaded PLA nanofibers. Different concentrations of *Eucalyptus camaldulensis* essential oil (7.5, 10 and 15%) were incorporated into PLA nanofibers via an electrospining technique. The nanofibers are characterized by, scanning electron microscopy (SEM) and dynamic mechanical analysis (DMA). Antibacterial activity of essential oil-loaded PLA nanofibers against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Enterococcus faecalis* were investigated by disc diffusion method. The antibiofilm activity of essential oil-loaded PLA nanofibers was studied against *Pseudomonas aeruginosa*. The results obtained from the biofilm formation test revealed that PLA essential oil inhibited the *Pseudomonas aeruginosa* biofilm by 9.3%, 12.8% and 12.6%, respectively. Drug releasing behavior of essential oil-loaded PLA nanofibers was investigated by UV-Visible spectroscopy. According to releasing results, as the amounts of *Eucalyptus camaldulensis* essential oil in PLA nanofibers increased, the releasing decreased. The essential oil-loaded PLA nanofiber successfully delivered about 160 h.

Keywords: *Eucalyptus camaldulensis* Dehn; Electrospinning; Nanofibers; Antibiofilm Activity; Drug Delivery

Evaluation of the phenolic and flavonoid content of selected dried fruits

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Fruits are generally regarded as rich sources of vitamins, minerals, phenolics and flavonoids. In order to increase the shelf-life of fruits, drying is applied. Processing of fruits leads to changes in composition of food products in terms of bioactive compounds. In the present study, the total phenolic and flavonoid contents of selected sun-dried fruits such as apricot, prune, white mulberry, black mulberry and sour cherry were investigated. According to the results, all dried fruit samples were found to contain substantial amounts of bioactive components. Dried prunes were found to have the highest amount of phenolics, while dried apricots exhibited higher flavonoid content when compared with the other fruits samples.

Keywords: dried fruits, phenolics, flavonoids.

DFT investigation of the heterocyclic molecules type dioxolane obtained from the protection reactions of carbonyl compounds

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The protection and deprotection of the functional group remain crucial challenges for organic chemists, while protection of the carbonyl group is done using different diols [1,2], as protective agents. Indeed, different types of catalysts such as a protic acid or Lewis acid [3] to form cyclic dioxolane catalyze this reaction. Therefore, the protection of a carbonyl function becomes necessary when the reagent has several functional groups [4]. This carbonyl must be protected against nucleophilic attack until its electrophilic properties can be exploited. We reported in this work the addition reactions between a series of carbonyl compounds types 1a-d and 1a'-d' and diols 2 and 3 (Figure1). The reactions between diols and series of carbonyl compound types 1a''-c'' protonated by Lewis acid are also studied. This study of reactivity have explored by the theoretical study using the program Gaussian 09 using DFT/B3LYP calculations with 6-311G standard basis set. Then, we studied from thermodynamic and orbital point of view, the possibility and the stereoselectivity of these reactions.

Keywords: carbonyl compounds, diols, stereoselectivity, DFT method.

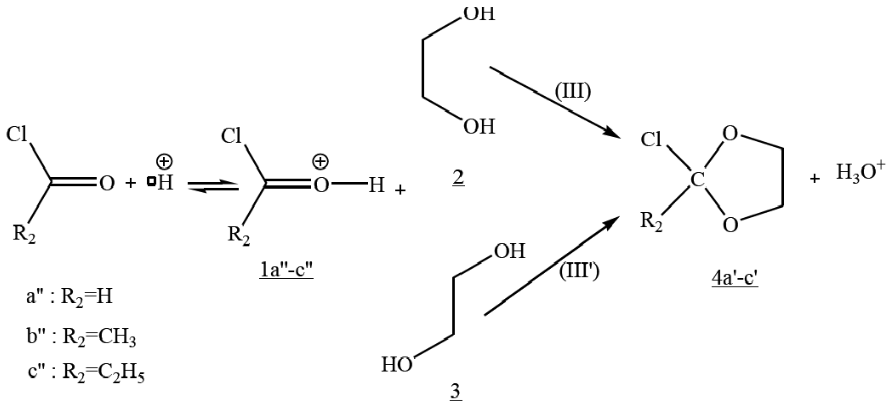

Figure 1

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Nanosuspensions of a novel diiodoaniline-derived contrast agent: Preparation, characterization and cytotoxicity study

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In medical imaging, a contrast agent is an injectable or ingestible substance that artificially enhances the natural low contrast of certain tissues to improve the visualization of an anatomical or pathological structure. Contrast agents used for medical x-ray imaging must have high density and atomic numbers to achieve high quality imaging. Such contrast agents must contain molecules with high X-ray attenuation (image contrast). Currently, iodine-based contrast agents are the most popular because of their high atomic number ($Z = 53$) and good X-ray attenuation properties.

However, iodine-based contrast agents have limitations such as rapid clearance, potential renal toxicity, nonspecific blood distribution, headache, and adverse events. Nowadays, it is quite common to work with nanoscale systems to eliminate these side effects. This study aims to synthesize a new iodinated contrast agent, prepare its nanosuspension using the nanoprecipitation method, investigate its cytotoxicity and compare its contrast properties with iohexol and iopromide by in vitro experiments.

keywords: medical x-ray imaging, contrast agent, iodine-based molecule, nanosuspension.

Improve the solubility of ibuprofen in an acid medium by a polymeric matrix

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The poor dissolution characteristics of poorly water soluble drugs is a problem to the pharmaceutical industry because the dissolution rate of poorly water soluble drugs could be the rate limiting process in the absorption of a drug from a solid dosage form.

With the recent advent of high throughput screening of potential therapeutic agents, the number of poorly soluble drug candidates has risen sharply and the formulation of poorly soluble compounds for oral delivery now a days presents one of the most frequent and greatest challenges to formulation scientists [1, 2].

Solubility studies of pure Ibuprofen and solid dispersions from Ibu-clay and Ibu-clay/PEG-CMC were carried out in 0.1 N HCl media solution.

After 2 and 24 hours, the sample solutions were filtered through Whatmann filter and from the filtrate 1 ml of solution was taken and diluted to a suitable concentration with respective media. The absorbance of the prepared dilutions was measured at 267 nm using UV-Visible Spectrophotometer.

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Improving the energy storage performances in flexible all-solid-state laser-induced graphene based microsupercapacitors using carbon black and Prussian blue additives

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Supercapacitors (MSCs) are increasingly coveted for storing energy for modern wearable electronics. Herein, we report on a facile and expandable method for the stepwise modification of polyimide-based laser-induced graphene electrodes to develop high-performance flexible all-solid-state supercapacitors using additives. We showed that the electrochemical modification of the electrode surface with carbon black (CB) microparticles and redox Prussian blue (PB) inorganic dye greatly enhanced the MSC performances. Indeed, the areal capacitance increased by 87% from 10.3 $\mathrm{mF\cdot cm^{-2}}$ at 0.1 $\mathrm{mA\cdot cm^{-2}}$ for MSC prepared from PI to 20.2 $\mathrm{mF\cdot cm^{-2}}$ at 0.1 $\mathrm{mA\cdot cm^{-2}}$ after modification with CB and by 410% from 10.3 $\mathrm{mF\cdot cm^{-2}}$ to 61.2 $\mathrm{mF\cdot cm^{-2}}$ at 0.1 $\mathrm{mA\cdot cm^{-2}}$ for MSC modified with both CB and PB. Thanks to the use of gel electrolyte a 3.0 V working electrochemical window was obtained, which allow the MSC to reach an impressive energy density of 152.5 $\mathrm{\mu Wh\cdot cm^{-2}}$ at a power density of 0.3 $\mathrm{mW\cdot cm^{-2}}$ measured at 0.10 $\mathrm{mA\cdot cm^{-2}}$. The PB-CB MSC remains stable upon galvanostatic charge-discharge cycling (4,000 cycles) and retain more 90% of its initial capacitance. Furthermore, the Bode plots for the different MSCs showed that their response time improved after the MSC surface modification with CB and PB-CB, denoting their beneficial effect on the MSC performances. Thus, this work demonstrates a facile, convenient, and expandable approach for to the design of cost-effective high performance MSCs with a low carbon fingerprint useful for powering low energy consumption electronics.

Keywords: Carbon black; Prussian blue; Energy Storage; Graphene; Supercapacitors;
High performance

Contribution to the study of complexation and antibacterial activity of new chitosan functionalized by isoxazole

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For several years, chitosan has received increased attention as a promising polymeric biomaterial with various applications. Chitosan has become a very promising biomaterial due to its biodegradability, biocompatibility, non-toxicity and low cost.

Chemical modification of chitosan is considered as a targeted, practical and highly effective strategy to improve its properties and therefore expand its application areas.

In this work we have achieved the modification of chitosan by isoxazole cycles in order to valorize this material and test its ability to complex metals. We carried out the complexation by UV-Visible and fluorescence spectroscopies. The results reveal a selectivity towards Cu^{2+} cation by absorption spectroscopy and towards Pb^{2+} and Hg^{2+} by fluorescence spectroscopy. We also performed the antibacterial activity on chitosan and modified chitosan. An improvement in the antibacterial activity of modified chitosan compared to chitosan was detected.

Effective removal of ethoxylated alkylphenols and their phenolic metabolites from real wastewater using a carbanious based adsorbent

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In this study, carbons were produced by a simple pyrolysis thermal conversion at 450, 650 and 850°C from waste vegetal biomass without any activation process. These adsorbents were used for the removal of sixteen micropollutants belonging to the classes of ethoxylated branched 4-nonyl and 4-t-octylphenols, as well as their degradation alkylphenolic products from a textile treated wastewater. These micropollutants are widely present in surface water and effluents of wastewater treatment plants, and are listed in the European Directive 2013/39/EU as priority/priority hazardous substances.

The sorption performances of the carbanious materials were evaluated using Langmuir and Freundlich models that described well the removal of a mixture of 14 branched ethoxylated 4-t-octyl and 4-nonylphenols, as well as 4-t-octyl and 4-nonylphenol, and performed on a real effluent wastewater. The adsorption performances obtained with the prepared carbons were nine to thirteen times lower than that of commercial activated carbon, whereas, it has a price at least sixteen times lower than that of activated carbon, thus making the prepared carbanious based material economically efficient.

Preparation and functionalization of isostructural SAPO-34. Application to the photodegradation of molecules organic

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this study focuses on the synthesis of nanocomposite materials, TiO_2/ SAPO-34, using the sol–gel method, which involves preparing a mixture between as-synthesized or calcined SAPO-34 zeolite and TiO_2 gel under hydrothermal crystallization and then calcining it at 400 °C for the formation of the TiO_2 anatase phase. The structural and textural features of the obtained materials were determined by various physico-chemical techniques such as thermogravimetric analysis, X-ray diffraction, scanning electronic microscopy, nitrogen sorption at 77 K, energy dispersive X-ray analysis and ultraviolet–visible spectrometry. The DRX results showed that calcination at 400°C of the mixture between the calcined SAPO-34 and TiO_2 gel led to the collapse of the original framework of zeolite, but formed the anatase TiO_2 in a nano-spherical morphology; however, the use of as-synthesized SAPO-34 supports provides a mixture phase between SAPO-34 and TiO_2 anatase after calcination. The photocatalytic properties of the SAPO-34/TiO_2 and TiO_2-type materials were tested for the removal of methylene blue (MB) dye. The MB degradation proved to increase as a function of contact time, catalyst mass and the initial concentration of MB.

Study of the biodegradation of composite materials reinforced with natural resources recovered from industrial areas

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The aim of our work is to contribute to the search for solutions to the problem linked to environmental pollution by plastic materials and lignocellulosic waste. Composites based on polyvinyl chloride/olive pomace flour (PVC/FGO) with 20% fiber content were prepared.

The lack of compatibility between plant fibers and some polymers is due to the hydrophilic nature of plant fibers and the more hydrophobic nature of the matrix. This incompatibility causes poor dispersion of the fibers and the formation of a heterogeneous material whose overall mechanical properties are not satisfactory. In order to improve adhesion at the fiber/matrix interface, the fibers were modified by gamma irradiation.

To complete this work, it is essential to carry out an in-depth study of the biodegradation of the materials produced. The PVC/FGO composites were subjected underground under environmental conditions. The changes induced by the exposure of composite materials to biodegradation were evaluated by Fourier transform infrared spectroscopy, optical microscopy and the measurement of mass loss.

Keywords: Polymer matrices / lignocellulosic waste / filler / physical treatment

Synthesis, characterization, and photophysical properties of functionalized six and seven-Membered-Ring carbohelicenes

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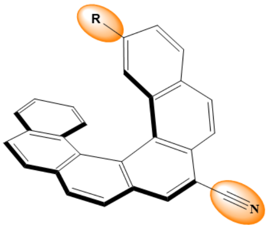
Helicenes are unique helical chromophores possessing advanced and well-controlled spectral and chemical properties owing to their diverse functionalization and defined structures. Functionalization, of a helicene, may have either the purpose of modifying the electronic properties of the parent helicene, e.g., by adding electron-withdrawing groups, or the scope of providing the helicene with a "handle", which can be reacted to bind the molecule to a metal surface, or again to allow for complexation of the helicene with metal ions.

In this context, the purpose of this study is to screen our continuing efforts on the synthesis of new functionalized helical scaffolds. The synthetic approach followed in this work is founded on the use of 4-Bromophenylacetonitrile as a convenient building block to provide the appropriate 1,2-diarylethene via Knoevenagel condensation. Helicenes precursors were then properly transformed into the functionalized helicene under UV irradiation. Upon success of this this goal, it was interesting to investigate experimental chiroptical, photophysical and electrochemical behaviors of such derivatives. Moreover, the cyano group grafted on the poly aromatic structure serve for increasing the solubility of the helicene in organic solvents, may improve its photophysical properties and may convert the helix skeleton into variously substituted large derivatives through different couplings.



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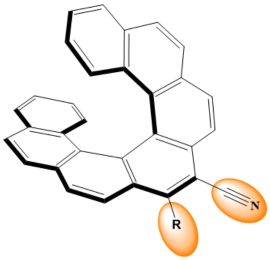

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Keywords : Helicene, Photooxidation, photophysical properties

ELECTROCHEMICAL BIOSENSOR FOR THE DETECTION OF BIOGENIC AMINE: COLORECTAL CANCER DIAGNOSTIC TOOL

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Background: Cancer is one of the most important public health problems in many countries in the world. Colorectal cancer is the third frequent disease and the second most common cause of death from cancer in the world In recent years, the relationship of the presence of biogenic amines in the serum of subjects suffering from colorectal cancer has been a center of interest for research

Materials/Methods: a platform was developed by the deposition of polydopamine nanoparticles synthesized to amplify the signal followed by the deposition of the enzyme diamine oxidase which will play the role of bioreceptor and pure glutaraldehyde to retain the enzyme and the platform, in general, each deposition was characterized by cyclic voltammetry and electrochemical impedance spectrum after fixing the platform the detection was made for different putrescine concentration.

Results: The biosensor gave linearity for the concentration range between 150pM and 1000 pM and LD equal 0.12 nM. The biosensor also showed selectivity for putrescine concerning the interferents Histamine and ascorbic acid, followed by the detection of putrescine in a real sample.

Conclusion: we have elaborated a biosensor capable of detecting putrescine a biogenic amine present in the serum of subjects suffering from colorectal cancer. This platform allowed us to have an efficient and sensitive biosensor.

Synthesis of new complexes containing iminophosphorane ligands

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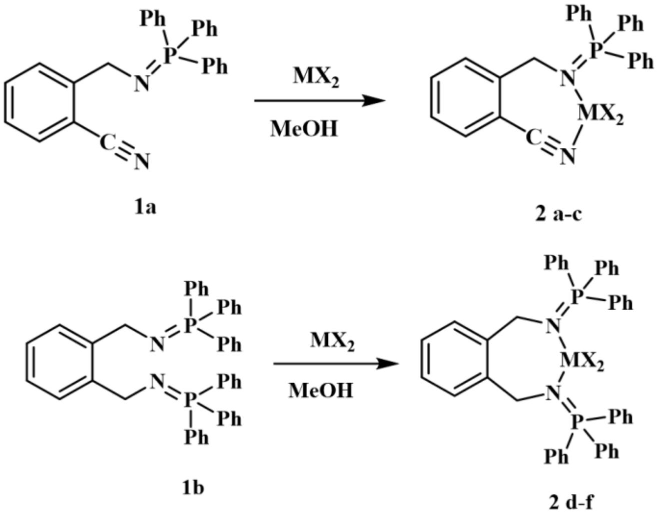
Organometallic compounds are interesting anticancer agents. Multiple efforts have been made to synthesize diverse and structurally different organometallic complexes with different antitumor properties and mechanisms of action [1-2]. Iminophosphoranes are nitrogen analogs of phosphorus ylides that can coordinate metals using a single pair of nitrogen atoms [3]. In this context, we were interested in evaluating the coordination properties of iminophosphoranes **1** towards zinc bromide, nickel bromide, nickel chloride and copper bromide. New cyclo-metallic complexes **2** were synthesized and studied [4].



Keywords: Iminophosphoranes, complexes.

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Synthesis and evaluation of the antioxidant activity of iminophosphoranes derivatives

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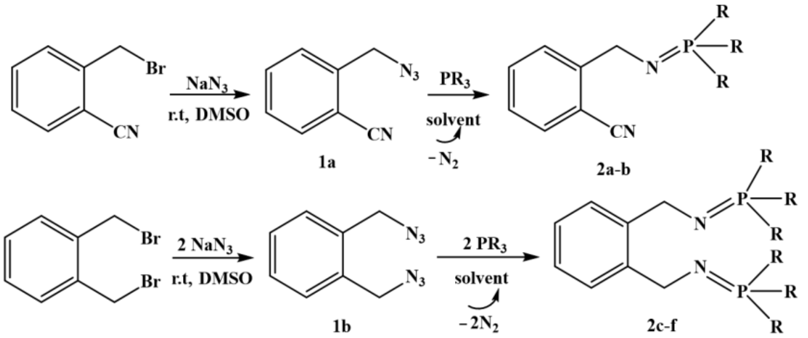
Organophosphorus compounds exhibit interesting applications in different fields. Iminophosphoranes were first synthesized by Staudinger in 1919 [1]. This method was based on the condensation of an azide and a phosphine. A few years later, diverse studies described the synthesis of iminophosphoranes derivatives [2-3]. New mono-iminophosphoranes and new bis-iminophosphoranes **2** were prepared by reaction of triphenylphosphine or tri-alkyl phosphite and azides **1**. Antioxidant activities of iminophosphoranes **2** were evaluated by a 1,1-diphenyl-2-picryl hydrazyl (DPPH) test. The antioxidant activity of prepared products was evaluated given the interesting activities noted for iminophosphoranes in previous studies [4].



Key words: Mono-iminophosphoranes, bis-iminophosphoranes, antioxidant activity, DPPH.

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CNC/PANI Nanoparticles Dispersion and their effects on PP/CNC Nanocomposites Mechanical Properties

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Biomass development and valorization is one of the important ways to control the non-renewable resources consumption. This strategy allows us to take advantage of the agricultural and forestry exceptional potential and to offer a new opportunity to these vital sectors. It can be used in various fields where biomass as renewable resources is expected to play an increasing role. Cellulose is the most abundant bio-renewable material and their unique structure generates nanoparticles as cellulose nanocrystals (CNC).

The use of natural fibers as fillers for polymers continues to receive a privileged interest due to the various improvements concluded on the mechanical properties, among other properties but a strong tendency for agglomeration. Also, CNC's hydrophilic characteristic leads to a chemical incompatibility with hydrophobic polymer matrices.

The aim of this work is to use polyaniline PANI as a support for Cellulose nanocrystals (Whiskers) during polyaniline synthesis in the presence of cellulose nanocrystals to improve their dispersion on Polypropylene nanocomposites. In our work, CNC were obtained according to an experimental protocol at several stages.

CNCs deposited on the Polyaniline was incorporated into the polypropylene matrix by melting compounding technique.

The obtained composite and PANI/CNC samples were characterized using different techniques: electrical conductivity, AFM, IRTF and mechanical properties to study and assess how polyaniline and cellulose nanocrystals affect microstructure, morphology and electrical properties of the biocomposites.

Keywords: CNC, Polyaniline, Polypropylene, Biocomposites, Nanoparticles.

The study of the natural degradation of high density polyethylene (HDPE) loaded with two vegetable powders

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The purpose of this work is the preparation of composite materials based on high density polyethylene (HDPE) and vegetable powders such as walnut shell flour (PCN) and cypress kernel flour (CYP). These powders are chosen with the aim of making HDPE a biodegradable material under climatic conditions.

The HDPE/PCN and HDPE/CYP composite materials were prepared on a two-roll mixer with three concentrations of the two flours, 10, 20 and 30%. Films of HDPE/PCN and HDPE/CYP composites were prepared by compression and were buried in soil and exposed to natural parameters such as sun, rain, heat and cold in order to study biodegradation of these materials. The study of biodegradation is carried out by infrared spectroscopic analysis of the films after burial for 2 and 4 months as well as the monitoring of weights loss and the study of morphology by optical microscopy.

The infrared spectroscopic analysis shows that the chemical structures of the composites buried in the soil for 2 and for 4 months have not changed. the appearance or disappearance of chemical bonds has not been observed. The observation of the morphology of the films by the optical microscope shows a change in the morphology of the composites during the first two months, this change is explained by the absorption of a large quantity of water by the vegetable flours, after 4 month of burial, the morphology returns to the initial state this is due to the drying of the films by the sun and the heat of the climate. These changes in the morphology are confirmed by the control of the weight of the films, it was noticed an increase in the weights in the first two months and a reduction in the weights in the last two months.

Keywords: High density polyethylene, composite materials, biodegradation, powder vegetable.

Novel 5,5’-isopropylidene bis-(ethyl 2-furoate)-derived copolyesters bearing simultaneously sulfonated and pyridinic moieties

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Within the depletion of fossil feedstocks and the worsening environmental pollution, biobased polymers, directly derived from renewable resources or prepared from monomers derived from renewable resources, have attracted much attention during the last decades as potential alternatives for their petroleum-based counterparts [1,2]. In the current study, two bisfurans-derived copolyesters incorporating equimolar amount of sulfonated and pyridinic units (*c.a.* 20 mol.%) in the main chain were successfully prepared by applying two different synthesis approaches, *(i)* either from mixture of monomers or *(ii)* via polycondensation of separately prepared oligomers. Their chemical structures, thermal properties and degradation behaviors were studied in order to assess their suitability for future applications

Keywords: Furanic monomers, sulfonated polyesters, pyridinic polyesters,

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Electrochemical sensor for amino acids based on Polysaccharide from Arthrocnemum indicum leaves modified electrode

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Polysaccharide from Arthrocnemum indicum leaves (PAI) derived from plant in the region of Monastir (Tunisian Sahel) has been used as a sensitive matrix to develop electrochemical sensor of L-Tryptophane and Tyrosine (Tyr) via differential pulse voltammetry (DPV). PAI layer was deposited on a glassy carbon electrode by simple adsorption. The characterization of this modified electrode was performed by cyclic voltammetry (CV) and was subsequently verified by differential pulse voltammetry (DPV) in the presence of $Fe(CN)_6^{-3/-4}$ as a redox probe. The modified electrode was used for the detection of amino acids (tryptophan and tyrosine) by cyclic voltammetry and by differential pulse voltammetry in a phosphate buffer solution (pH = 7). As a result, the modified electrode with PAI exhibited high sensitivity and good analytical performance towards the detection of the amino acids.

Keywords: polysaccharide, Arthrocnemum indicum, DPV, modified GCE, L-Tryptophane, Tyrosine (Tyr)

Elaboration and characterization of a nanofibrillated cellulose modified electrode for the detection of amino acids

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The development of a glassy carbon electrode modified with anionic cellulose nanofibers (NFC^-) was achieved by a simple method on the surface of the electrode. The characterization of this modified electrode was performed by cyclic voltammetry (CV) and was subsequently verified by differential pulse voltammetry (DPV) in the presence of $Fe(CN)_6^{-3/-4}$ as a redox probe. The modified electrode was used for the detection of amino acids (tryptophan and tyrosine) by cyclic voltammetry and by differential pulse voltammetry in a phosphate buffer solution (pH = 7). The sensitivity of the NFC^- modified electrode for the detection of tryptophan has been increased 3 times more compared to the sensitivity of the bare electrode; we also note a decrease of the limit of detection. Similarly for the detection of Tyrosine.

Keywords: modified electrode, cellulose nanofibers, electrochemical detection, amino acids.

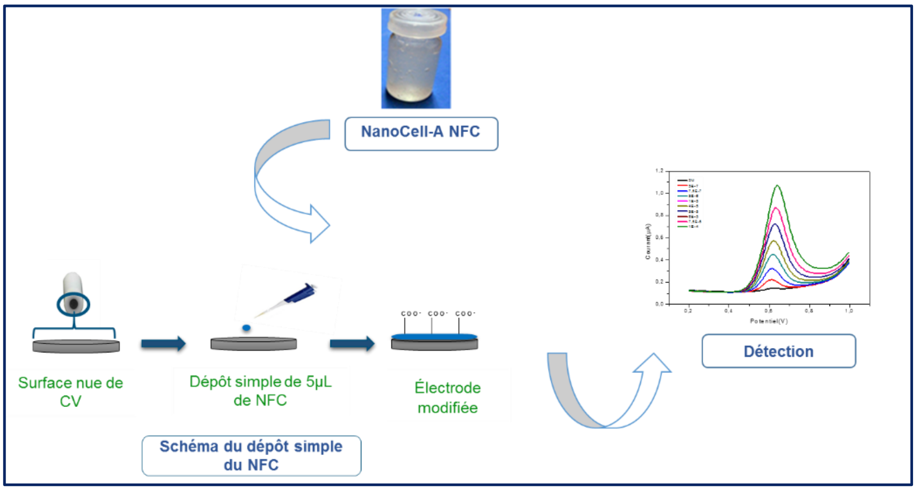

Figure: Elaboration of amino acids sensor based on NFC

Valorisation of the lavender (*Lavandula angustifolia*) extratcs in the center of Algeria.

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This work is carried out in order to study the effect of the lavender extracts originated from leaves, flowers or stems, on the yield of polyphenols extraction, physico-chemical characteristics and the antibacterial activity.

The results obtained on the polyphenol extraction yield revealed relatively high extraction rates observed in the aqueous extracts of leaves (13,03%) against 7,47% for the stems and 7,03% for the flower extracts. Some qualitatives tests carried out and which correspond to the physico-chemical analysis revealed the richness of this plant in secondary metabolites (saponins, tannins, quinones, sterols and triterpenes). Saponins are better presented in leaf then the other extracts. The antibacterial activity of extracts has demonstrated the antibacterial effect of lavender against two types of bacteria (Escherichia coli and citrobacter). However, the stem extracts are more resistant to citrobacter with a zone of inhibition of 22,33 mm and the three extracts (leaves, flowers and stems) are resistant to Escherichia coli with zones of inhibition that varied between (13,67 and 14,66 mm).

Key words : Lavender, aqueous extract, yield of polyphenols, physico-chemical, antibacterial.

Performance of sulfonated poly (ether ether ketone) modified with sulfo ethyl cellulose for proton exchange membrane Fuel cells

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Electrolytic membranes for fuel cell application were prepared from sulfonated poly (ether ether ketone) (SPEEK) blended with different proportions of sulfo ethyl cellulose (SEC, 5 wt.% and 10 wt.%). The different composite membranes were characterized concerning their structure, surface morphology, and thermal stability using Fourier transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy, and thermogravimetric analysis. The thermal properties and water absorption of the composite membranes were improved compared to pristine SPEEK. Proton conductivity performance was improved in the composite membrane that included 10 weight percent SEC. The composite material SPEEK/SEC demonstrated noteworthy performance and has potential for use in electrochemical applications. When compared to a membrane made of pristine SPEEK, the composite membrane would function excellently thanks to the sulfonic acid groups incorporated in the SEC. Furthermore, composite membrane showed important proton conductivity of up to 110 mS/cm compared with the SPEEK at temperatures above 100 °C.

Corrosion inhibition of steel in the process industry using phenothiazine derivatives

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The aim of this study is to investigate the phenothiazine derivatives as potential corrosion inhibitors for low-carbon steel (S235) in a solution containing NaCl 3% (pH 5) [1]. The corrosion behavior was investigated by electrochemical impedance spectroscopy and potentiodynamic polarization measurements. The results revealed that the investigated phenothiazine derivatives have a good protective effect against steel corrosion. To understand the mechanism of corrosion inhibition induced by phenothiazine derivatives the theoretical quantum chemical calculations were performed. Knowing that the corrosion process is a complex one, the theoretical model of the corrosion process was described using the experimental kinetics data of the electrode (S235) depending on the potential of the electrode. The estimation of the parameters was performed using a global least squares objective function based on the polarization data.

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Contribution to the study of selective complexation of Cu (II) ion by a turn on fluorescent chemosensor

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In recent years, the development of fluorescent and colorimetric organic chemical sensors for the detection of metal ions has attracted increasing attention from scientists and research teams. This is due to the relative ease and low cost of fabrication, good selectivity and high sensitivity of these molecular sensors.[1] Advances in the field of sensors for the selective detection of trace amounts of heavy metals are spreading and involving different research fields such as chemistry, biology, medicine, and environmental science.[2]

These studies involve the design and synthesis of chromophores/fluorophores that contain one or more chelating sites. For effective optical and colorimetric detection, spectroscopic analysis (absorbance and fluorescence) must allow for a significant change in signal upon interaction with the specific ion.

Herein, we report the design and study of a novel Shiff base chemosensor (VAP) containing NO donating groups, in which a central alkylated aromatic core is linked to two phenols terminal groups through CN bridges. The choice of CN linker is motivated by its high binding capability and for its Photo-induced Electron Transfert (PET) and Chelation-Enhanced Fluorescence (CHEF) mechanisms. The synthesized Shiff base structure was confirmed by NMR and FT-IR spectroscopies. The optical study showed a selectivity of VAP towards Cu (II) ions in THF/H_2O solution. Adding Cu^{2+} ions to VAP dilute solution induced a naked eye color change from colorless to yellow accompanied with a fluorescence turn-on.

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Synthesis and characterization of phosphite and phosphorochloridate derivatives from hydroxysulfides

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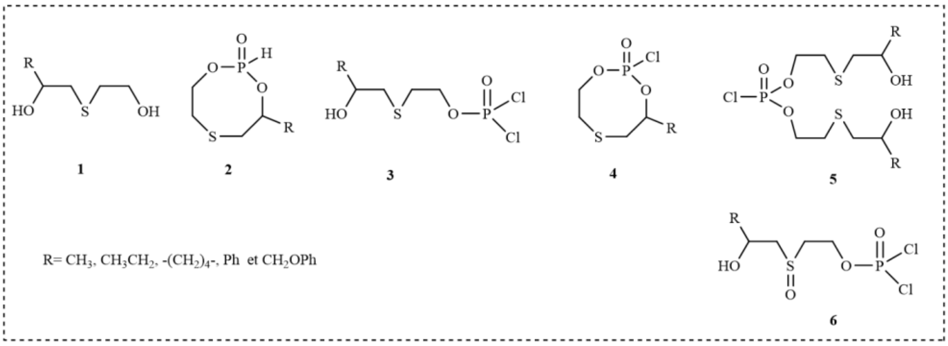
Phosphorus compounds constitute a very important family of compounds due to their use as antiviral, anticancer, and antituberculosis agents [1,2]. They also find many applications mainly in various industrial processes, plasticizers and in coordination chemistry as versatile ligands [3,4]. This encouraged us to synthesize new phosphorus products starting from β-β`-dihydroxysulfides (**1**) [5], using different reaction conditions and various phosphorus reagents. Thus, the corresponding phosphites (**2**) and phosphorochloridates (**3**-**6**) were obtained in moderate yields. The new products **2-6** where characterized with multinuclear NMR spectroscopy, in particular by proton-coupled ^{31}P NMR spectra. These new organophosphorus compounds and their derivatives can be used as potential ligands that would bind to metal ions either through the phosphoryl oxygen or sulfur atoms, or both to give more stable chelate complexes.



Key words: phosphorylation, phosphites, phosphorochloridates, phosphates

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Synthesis and oxidation of a new family of hydroxysulfides

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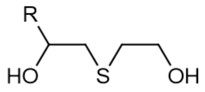
The β-dihydroxysulfides and their corresponding oxides are potential sulfur intermediates for the synthesis of a number of polyfunctional molecules [1]. These compounds have interesting biological and pharmacological properties; such as enzyme inhibitors, antivirals and antibiotics [2,3]. In this work, we were interested in the synthesis and reactivity of some sulfur derivatives. The starting β-β`-dihydroxysulfides **1** were synthesized by epoxide opening reactions with mercaptoethanol. The oxidation of these thioetherdiols with $H_2O_2$ using different reaction conditions was carried out to produce a new series of β-β`-dihydroxysulfoxides **2.** The new products where characterized with multinuclear NMR spectroscopy. These dihydroxysulfides and dihydroxysulfoxides can be used as neutral monodentate or anionic tridentate ligands.



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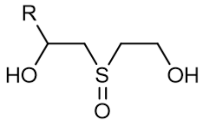

2

R=Me, Et, -$(CH_2)_4$- , CH_2OPh, Ph.

Keywords: Hydroxysulfides, hydroxysulfoxides, oxidation

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Preparation and characterization of Polypropylene /Polyethylentherephthalate/wood Fibers composites in the presence of compatibiliser

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This work consists in studying the structure-property relationships of polymer blends based on recycled polypropylene (PP) and poly (ethylene terephthalate). This research reports the results of incorporating a vegetable filler into the PP / r-PET blend. A synergistic effect is observed during the simultaneous incorporation of the wood flour and the agent compatibilizing MAPP in the polymer mixture. Composites based on PP / r -PET was prepared in two steps. Scanning electron microscopy (SEM) analysis of the fractured surface samples revealed a better interaction between the WF and the polymer mixture. The thermogravimetric analysis (ATG / DTG) of the samples showed that the presence of the filler decreases the thermal stability of the composites compared to the PP / r -PET mixture, but does not accelerate the degradation process, the DSC allows to show that the incorporation of wood flour in the mixture of polymer PP / PET-r has an influence on the values of Tf of the two polymers (PP and r -PET), with an increase in the degree of crystallinity was observed.

Keywords: Composites, polymers, natural fibers, interface, compatibilization, mechanical properties.

Synthesis and biodistribution of [^{99m}Tc]-N-[4-nitro-3-trifluoromethyl-phenyl]cyclopentadienyltricarbonyltechnetium carboxamide, a nonsteroidal antiandrogen flutamide derivative as tumor imaging agent

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Prostate cancer is one of the most frequently diagnosed cancers and is the second leading cause of cancer death. The natural steroid androgens, namely the circulating hormone testosterone, and its active metabolite dihydrotestosterone (DHT), are responsible for the development and maintenance of normal and abnormal prostate cells. It is important to note that when the cancer is detected it has already had a long time to develop. Therefore, it is crucial to detect the cancer at its earliest stages. Currently, the standard tests for detecting prostate cancer has its own limitations. Nowadays, new diagnostic methods, such an imaging positron emission tomography (PET), using β+ emitting radioisotopes, is well developed. However, difficulties in production of the short-lived positron (b+)-emitting isotopes, may have restricted clinical applications. The development of a clinically routine single photon emission computer tomography (SPECT) imaging agent utilizing ^{99m}Tc would provide an alternative. Therefore, there is still a need for more effective androgen imaging agents to be developed.In our efforts to develop a novel class of SPECT imaging agents based on nonsteroidal androgen receptor (AR) antagonists, we have synthesized N-cyclopentadienyltricarbonyltechnetium-N-[4- nitro-3-trifluoromethyl-phenyl] carboxamide (NF^{99m}Tc), an analog of the AR antagonist ligand flutamide. NF^{99m}Tc was obtained in 82% yield from the reaction of N-[4-nitro-3-trifluoromethyl-phenyl]-ferrocenecarboxamide (NFFe) with fac-[^{99m}Tc(H$_2$O)$_3$(CO)$_3$]$^+$ in DMF–water at pH 1 and at 150°C for 1 h. The corresponding Re analog was also prepared. In vitro assays demonstrated high stability of NF^{99m}Tc under physiological conditions, buffer and blood. The tissue biodistribution in mature male Wistar rats showed a significant selective uptake by prostate.

Pharmaceutical cocrystals consisting of metronidazole and sulfamethoxazole

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Keywords: Cocrystals; metronidazole; DSC

As small molecule drugs become harder to develop and less cost effective for patient use, efficient strategies for their property improvement become increasingly important to global health initiatives. As a new crystal engineering strategy, cocrystals have opened a new avenue to modify the physicochemical properties of pharmaceutical solids.

Improvements in the physical properties of Active Pharmaceutical Ingredients (APIs), without changes in the covalent chemistry, have long been possible through the application of binary component solids. In order to rationally discover the best multicomponent phase for drug development, intermolecular interactions need to be considered at all stages of the process.

In this work, a syntheses and characterization of metronidazole + sulfamethoxazole (M+S) cocrystal are firstly conducted. The physical state of cocrystal was characterized by PXRD, DSC, and FTIR.

The FTIR spectra of both cocrysts, a strong and wide absorption band of 3200 cm^{-1} at 3400 cm^{-1} is characteristic of the hydrogen bond O-H. The thermal behavior of the co-crystal was distinct, with a different melting temperature from that seen with either of the individual components; this suggests the formation of a new phase:(M+S) cocrystal.

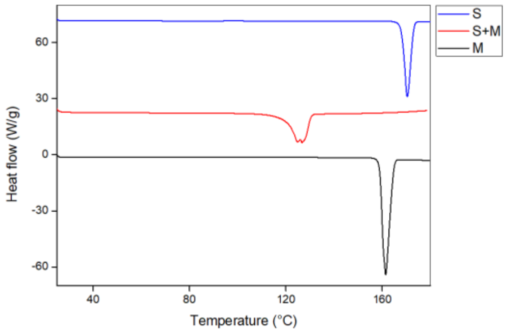

Figure 1:thermograms DSC of the M+S cocrystal

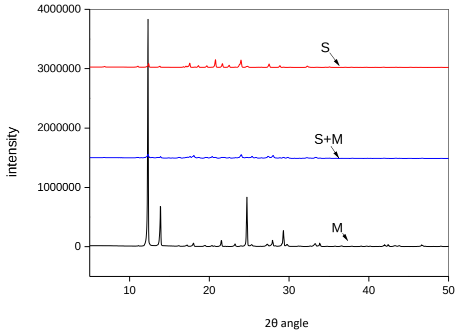

Figure 2:PXRD patterns of M+ S cocrystal

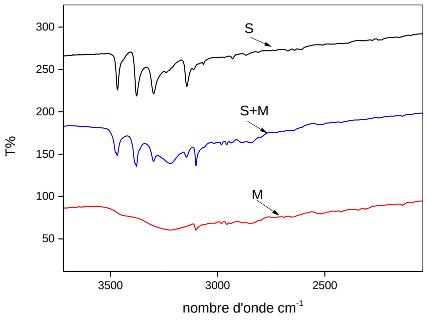

Figure 3 spectre FTIR of the M+S cocrystal

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An efficient synthesis of oxathian-2-imines and/or oxazin-2-thiones via ring expansion of 2-hydroxymethylaziridines with isothiocyanates

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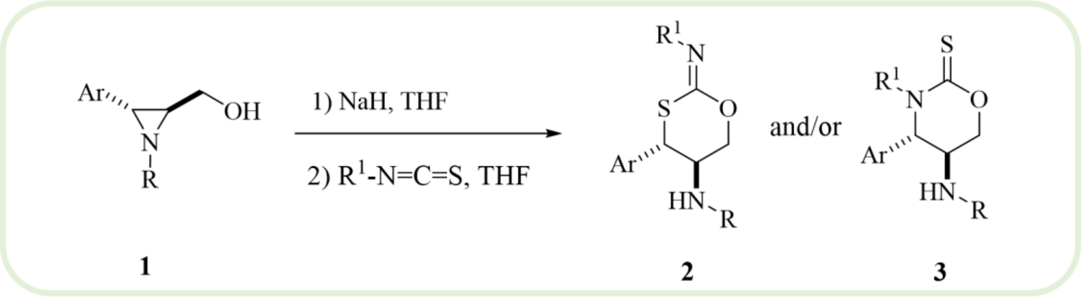
Expansion of the aziridine ring with different nucleophiles is frequently used as an efficient method for the synthesis of a variety of four-, five- or six-membered heterocycles that may have interesting biological activity [1-2]. In this context and as a continuation of our research work on aziridines, [3] we herein describe the synthesis of 1,3-oxathian-2-imines **2** and 1,3-oxazin-2-thiones **3** involving the ring expansion of N-alkyl 2-hydroxymethylaziridines. This synthesis was carried out from the successive reaction of NaH and isothiocyanate on 2-hydroxymethyaziridines **1** via completely regio- and stereoselective process.



Key words: 2-hydroxmethylaziridines, oxathian-2-imines, oxazin-2-thiones.

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The confinement of Polyvinylpyrrolidone (PVP) in water/AOT/isooctane reverse micelles: Effect on electrical percolation phenomenon

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The confinement of polymers in reverse micelles is important for various industrial applications, particularly in drug delivery **[1]**. This study examined how confining Polyvinylpyrrolidone (PVP) affects the percolation phenomenon in water-in-oil reverse micelles. Results showed that higher temperatures reduced the structural and dimensional parameters of PVP, while PVP confinement altered micellar size and shape, affecting the critical value of water to AOT molar ratio for percolation. PVP confinement also impacted percolation parameters, accelerating the percolation process. The activation energy of percolation significantly increased in the presence of PVP, indicating an increase in charges exchanged between micelles **[2]**.

Keywords: Polymer, reverse micelles, confinement, percolation.

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Influence of pistachio leaves on the phytochemical composition and biological properties of bread

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Research on natural products in the food industries is increasing mainly due to the drawbacks of synthetic chemistry. The effectiveness of food additives has declined with a wide variety of them being responsible for several diseases such as cancer... Plants present a renouvelable source of biomolecules which can be use in wide applications: food, cosmetic, pharmacologic...

Pistacia vera L. belongs to the Anacardiaceae family and the genus *Pistacia*. Pistachio production generates a large amount of different waste in Tunisia, one of this waste is leaves.

Leaf of pistachio was extracted using ultrasound assisted extraction. The obtained extract was characterised by the determination of total phenolics content (TPC), total flavonoids content (TFC) as well as the biological activity by the free radical scavenging assay using DPPH the results were expressed as mg of Trolox Equivalent (TE)/g extract. Finally, the antimicrobial activity was evaluated.

The results showed that the pistachio leaves were rich of phenolics compounds, the scavenging capacity against the radical DPPH was good and had a strong antimicrobial activity. Thus, it was concluded that the extract of *Pistacia vera* L. leaves could be added to baking formulations to improve bread properties and prolong its shelf life.

Key words: ultrasound assisted extraction, phenolic compounds, biological properties, bread.

Microencapsulation Using Natural Cactus Extracts As Microencapsulating Shell

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This study aimed to invistigate the micro-formulation of cap-sules using natural polysacharides, such as cactus mucilage, carboxymethyl cellulose sodium salt (CMCNa) and chitosan as the wall material, for the transport and supply of sunflower oil. Mucilage cactus samples were extracted from Opuntia ficus indica (OFI) by precipitation at different supernatant pH values (2, 4 and 12). The physicochemical characteristics of mucilage samples and obtained microcapsules were studied. The FTIR analysis showed the presence of galactose and pectin in mucilages. The XRD detected minerals as calcium salts. The SEM revealed particles with irregular shapes and forming particle aggregations. All oil–core microcapsules were characterized, and the results showed that the different shell materials could be used to microencapsulate sunflower oil. Among them, the microcapsule crosslinked with mucilage and chitosane was the most suitable, with the highest encapsulation efficiency (95 %). The integrated data indicated that the sunflower oil was successfully encapsulated by complex coacervation using the cactus extractas the carrier material. Moreover, Mucilage cactus could be used as a potentially effective shell material, especially with a cationic polymer, for protection of bioactive compounds from oxidative deterioration and for drug delivery.

Kinetic pyrolysis of Agrostis curtisii kerguélen leaves

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In this study, the pyrolysis behavior and kinetic analysis of Agrostis curtisii kerguélen (HPACK) leaves, in nitrogen flow were studied by thermogravimetric analysis at four different heating rates 5, 10, 15 and 20 °C/min. Thermogravimetric analysis showed three distinct zones of thermal decomposition. Two model-free (isoconversional) methods, Kissinger-Akahira-Sunose (KAS) and Flinn-Wall-Ozawa (FWO) were used to determine the apparent activation energy. Activation energy average values were shown to be 238.26 - 234.97 kJ mol^{-1} for HPACK leaves, as calculated by KAS and FWO methods, respectively.

Keywords: pyrolysis, kinetic analysis, model-free (isoconversional) methods

Proton conductivity of sulfonated polyetheretherketone (s-PEEK) and crosslinked polyvinyl alcohol (XL PVA) films reinforced by clay

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In this work we study composites of 50-65% sulfonated polyether ether ketone (s-PEEK) and 20% crosslinked polyvinyl alcohol (XL PVA); reinforced by a commercial montmorillonite at various Wt%. We aim to use our composites as electrolyte membranes for fuel cells. Obtained films were characterized by X-ray diffraction, differential scanning calorimetry, direct current conductivity at various relative humidity rates and dielectric measurements between 10^{-1} Hz and 1 MHz in the temperature range from 10 to 220°C. XRD Results show the presence of characteristic peaks of the MMT, with gradual reduction of the grain size of ordered regions in the polymer matrix after the sulfonation, the crosslinking and/or the clay addition. For both polymers, the cited three operations increase the glass transition, indicating the lowering of the polymer chain mobility. This affects also the proton conductivity σ_{dc} which decreases due to these modifications. In all cases we find acceptable fit of $\sigma_{dc}(T)$ by an Arrhenius law with activation energy compatible with ionic transport and depends on the clay Wt%. The Ac conductivity is well fitted by the Jonscher law with a dominant effect of the electrode/sample polarization at low frequencies; this effect appears at higher temperatures. From the high frequency power law we deduce the dominance of the correlated barrier hopping mechanism (CBH). By the dielectric modulus we show the presence of two non-Debye relaxation modes attributed to interface polarization and charge hopping processes.

Synthesis, X-ray crystallography, spectroscopic characterization, electronic structure investigation and molecular docking studies of Cobalt (II) metal complex against

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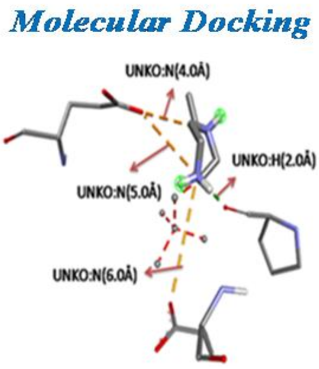
The present work undertakes the study of novel hybrid compound, which have been obtained due to the interaction of organic and inorganic entities with cobalt transition metal. The novel solid-state complex (1-ethylpiperaziniumtetrachlorocobaltate(II)), was synthesized and characterized using several physic-chemical techniques, such as single crystal X-Ray diffraction analysis, spectroscopic measurements, intra and intermolecular studies and DFT calculation and biological properties. The atomic arrangement of $(C_6H_{16}N_2)[CoCl_4]$ can be described as an alternation of organic and inorganic layers along the b and c axis, which are interconnected by hydrogen bonds. Hirshfeld surface, topological-In-moleculs (AIM) and natural bond orbital (NBO) were conducted to investigate intermolecular interactions. The reduced density gradient (RDG) was used to study non-covalent interactions. In this study present the crystal structure studies, characterization, electronic properties investigation, and the in-silico biological activities of $(C_6H_{16}N_2)[CoCl_4]$ hybrid material against 6PXZ, 6RK2 and 6Y8Q bacterial receptor proteins. The electronic structural properties were elucidated within the framework of density functional theory (DFT), the associated results were compared with experimental data to investigate the antioxidant properties of single Cobalt (II) metal complex. The interaction between the ligand and the receptor proteins has the following binding affinities: 5 kcal.mol^{-1}, -6 kcal.mol^{-1} and -5 kcal.mol^{-1} for 2EPCO_6PXZ, 2EPCO_6RK2 and 2EPCO_6Y8Q protein-complex interactions, respectively. However, the commercial drug when bind with the selected protein had lower docking scores: cycloserine_6PXZ, cycloserine_6RK2 and cycloserine_6Y8Q with respective binding affinity values of -4.0 kcal.mol^{-1}, -4 kcal.mol^{-1} and -1 kcal.mol^{-1}.



Keywords: Hybrid compound; crystal structure; spectroscopy; DFT; molecular docking

DFT investigation of solvent, substituent and catalysis effects on the intramolecular Diels-Alder reaction

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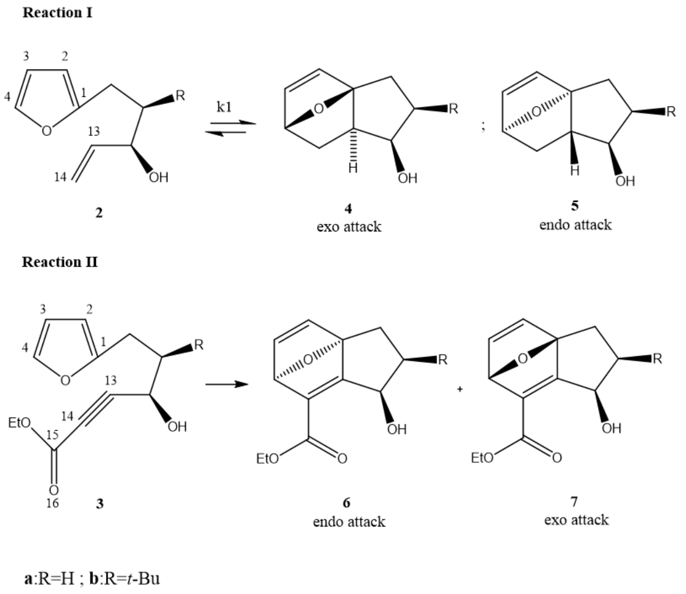
In this study, we report on a DFT investigation of two intramolecular Diels-Alder furan reactions [1]. Optimizations of the studied structures, TS and IRC calculations, were carried out at B3LYP/6-31G(d) level. We have studied the effect of substituent, solvent and Lewis acid catalyst on cyclization-retrocyclization equilibria, activation energies, and stability of the desired products [2]. The analysis of orbital coefficients, IRC curves, and Wiberg indices have proved that both reactions are under orbital control. We have found that for the reaction I (2↔4 + 5), where R = H, the exo attack is favored by hydrogen bond interaction, while for R = t-Bu, the steric hindrance leads to the endo attack. For the reaction II (3 → 6 + 7), the t-Bu-substituted products are the most stable ones. At another level, we have found that it is recommended to use polar organic solvents as DMSO with Lewis acid catalyst BF_3 [3]. The latest leads to accelerate the reaction II with stabilization of the desired products.

Keywords Intramolecular Diels-Alder reactions, DFT calculations, Wiberg indices, IRC



Scheme Intramolecular Diels Alder reactions of furan derivatives **2** and **3** [4]

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New access to benzotriazepine from imidates

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The study of the heterocyclic compounds of benzotriazepine has known a considerable development in the last years due to the revealing of their varied effects in diverse domains. In particular, research intensified and turned to the synthesis of this kind of compounds and the study of their activities in the pharmacological[1] and agrochemical[2] fields.

Owing to all these real and potential properties we established a research program that focused on the synthesis of new benzotriazepine, and resulted in the discovery of a simple and general route for the preparation of derivatives new benzo[1,3,5]triazepin-4-amine from imidates. **(Figure 1)**

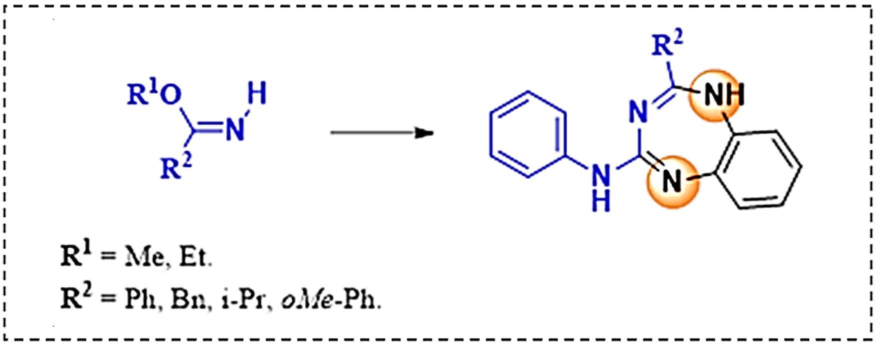

Figure 1. Synthesis of new benzotriazepine.

Key words : imidate and benzotriazepine.

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Adsorption of Indigo Carmine dye by biochar prepared from pomegranate peels

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This study focuses on the adsorption of Indigo Carmine dye by biochar prepared from pomegranate peels by pyrolysis. The biochar was characterized by UV –visible, FTIR and SEM. The optimization of the removal process was performed using the central composite design (CCD) combined with the surface response methodology (RSM). The adsorption yield optimization was carried out by varying parameters such as concentration and contact time. The maximum yield of adsorption was found to be 99.47% after 38 minutes of stirring, at pH 4.8, and using 0.02 g of adsorbent. The results indicate that the pseudo-second-order kinetic model is the most suitable for the adsorption of Indigo Carmine by the biochar with a coefficient of correlation $R^2 = 0.99$. Additionally, the thermodynamic investigation demonstrated that the adsorption process was spontaneous, exothermic, and physisorption-based.

Keywords: Adsorption, carmine indigo, biochar, CCD optimization

A semi-empirical equation based on the Manning theory for electrical conductivity of polyelctrolyte solution

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We report in this work a novel semi-empirical equation based on the Manning theory developments to describe the electrical conductivity of polyelectrolyte solutions versus its concentration. In fact, the conductivity of poly(soudim-4-styrenesulfonate) (M_w=70000 gmol^{-1}) dissolved in water is measured over the temperature range from 25°C to 50°C. The equivalent conductivity was deduced from the Manning's theory and compared with those deduced from experimental measurement. The Manning equation is corrected and a semi empirical equation is proposed to describe correctly the experimental results

Keywords: Polyelectrolyte, solvent / non-solvent mixture, electrical conductivity, Manning's theory, semi-empirical.

Investigation of crystal structure, optical study and biological properties of a new 2-methylpiperazine-1,4-dium tetrachlorocobaltate(II) compound based on DFT calculation

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A new organic-inorganic hybrid compound, 2-methylpiperazine-1,4-dium tetrachloro-cobaltate(II), was synthesized by slow evaporation at room temperature. Single-crystal X-ray diffraction analysis indicates that the asymmetric unit in this compound consists of one tetrahedral geometry $[CoCl_4]^{2-}$ and one diprotonated organic cations $[C_5H_{14}N_2]^{2+.}$ The structure consists of an alternation along the a-axis of organic-inorganic layers parallel to the (a, b) plane. The inorganic layers built up of isolated tetrahedral $[CoCl_4]^{2-}$. The crystal packing is stabilized by electrostatic interactions and N-H…Cl, C-H…Cl hydrogen bonds between cations and anions. Hirshfeld surface is conducted to investigate intermolecular interactions. The quantum mechanical calculations such as geometry optimization, vibrational frequencies, simulated UV-Visible spectrum, Frontier molecular orbitals (FMOs) analysis, nonlinear optical (NLO) properties were made together with the experimental studies. Good agreement was found between theoretical and experimental results. In fact, the second hyperpolarizability value $\langle\gamma\rangle$, of the title compound is equal to $0.8665 \times 10^{-36}\ esu$. This clearly indicates that the hydrogen bonds play an important role not only in the creation of crystal structure and its stability, but also in the enhancement of the polarizability α and the hyperpolarizability $\langle\gamma\rangle$ of the crystal. Hence, the large $\langle\gamma\rangle$ value suggests that the title compound is a NLO material of interest and could be adopted in various optical applications. In addition, The HOMO –LUMO energy gap value of 2.65 eV indicates that our compound behaves as a semi-conductor material. In the other hand, the bioassay results showed that this structure exhibits significant antioxydant and antibacterial activities.

Keywords: Hybrid compound, Crystal structure, Optical properties, DFT calculation, HOMO-LUMO energy gap, Biological activities.

Graphical abstract:

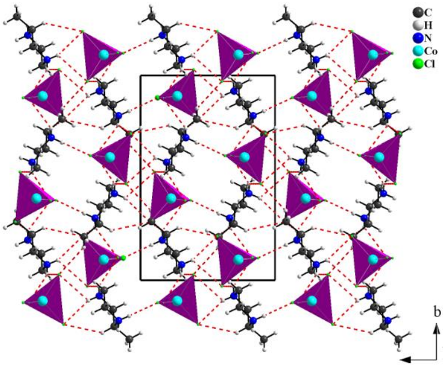

Fig. 1: Projection along the a-axis of the crystal packing of $(C_5H_{14}N_2)CoCl4$ compound; The dotted lines indicate hydrogen bonds

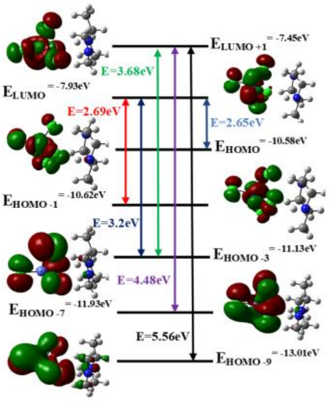

Fig. 2: Representation of some Frontier Molecular Orbitals with their orbital energies (eV) and orbital energy gaps (eV)

A novel 1D square-pyramidal coordinated palladium (II) hybrid compounds $[C_9H_{16}N_2]PdX_4$ (X=Cl, Br) showing broadband emission, electrical properties and narrow optical band gap

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Hybrid halide perovskite-like semiconductors are attractive materials for various optoelectronic applications, from photovoltaics to smart devices. Here, two new one-dimensional palladium halides, $[C_9H_{16}N_2]PdCl_4$ (1) and $[C_9H_{16}N_2]PdBr_4$ (2) showing electrical and optical properties were prepared by reaction of 2,4,6-trimethyl-m-phenyl-enediamine with PdX_2 (X = Cl, Br) in the corresponding concentrated halogen acids HX. Single-crystal X-ray diffraction analysis reveals that compounds $[C_9H_{16}N_2]PdX_4$ (X=Cl, Br) belong to isostructural phases and crystallize in the orthorhombic system with non-centrosymmetric space group $Pmc2_1$. The basic unit of the crystal structure in each compound is composed of an independent $[PdX_4]^{2-}$ anion charge balanced by a $[C_9H_{16}N_2]^{2+}$ cation. Remarkably, the central Pd(II) atom is coordinated by five halogen atoms PdX_5 forming a distorted square-pyramidal coordination geometry. These hybrid compounds present good thermal stability up to 500 K. The DSC and electric measurements show that no phase transition occurs in the compounds over the temperature range 300–400 K. Optical absorption measurements suggest that the two hybrids Pd(II)-based metal halides have a narrow optical band gap (Eg) of ~3.26 eV (X=Cl) and ~2.98 eV (X=Br) which makes them promising materials in optoelectronic devices.

Microwave assisted extraction of essential oils from *Pinus halepensis* Mill. seeds and antioxidant activities

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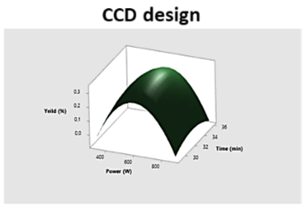
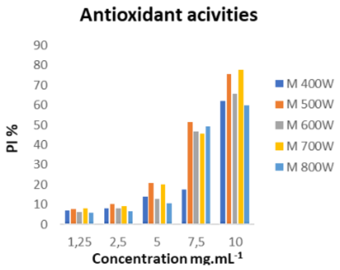
In this study, the extraction of the essential oil from Pinus halpensis Mill. needles was optimized using microwave-assisted processes for the first time to our knowledge. In order to achieve the best yield and also the highest quality of the essential oil in the microwave-assisted method, the optimal values of operating parameters such as extraction time and microwave irradiation power were investigated using a central composite design under response surface methodology. Results show that the optimal extraction conditions consist of a microwave power of 600 W and an extraction time of 32 min. Furthermore, the yield of essential oil was 0.333 % under the optimal conditions. The antioxidant activities of the essential oil was assessed by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay, the IC_{50} values ranging from 4.51 to 5.26 $mg.mL^{-1}$. Finally, microwave-assisted extraction is considered a rapid process, green technology and an efficient alternative for the extraction of essential oil from medicinal and aromatic plants.

Keywords: Microwave assisted extraction, *Pinus halpensis* Mill., essential oil, antioxidant activities





The $C_6H_4(NH_3)_2(NO_3)_2$ assembly investigations: Crystal structure, optical properties and impedance spectroscopy, electrical relaxation with Ac conductivity studies.

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The assembly involving ([C6H4(NH3)2]2+/(NO3)–) hybrid as building units has been conceived to carefully produce hybrid-supramlecules with H- bonded nitrogen, which is expected to replace conventional optical materials. Successfully obtained, a new hybrid compound, C6H4(NH3)2(NO3)2 by hydrothermal methods and characterized using single-crystal X-ray diffraction method, Hirshfeld surface analysis, IR / CP MAS- NMR spectroscopy and UV–vis spectrophotometry. Electrical properties and ac conductivity of the title compound has been reported in the temperature and frequency range from 303 to 413 K and 1–106 Hz, respectively. The impedance and electrical modulus spectral data and the frequency and temperature correlation analysis of the Nyquist plots has shown that the grains and grain boundaries contribute to the electrical properties of the prepared materials. The single crystals were obtained by a hydrothermal method. It was found to crystallize in the monoclinic system P21/c with the following lattice parameters: a = 12.6966(17) Å; b = 7.9444(11) Å c = 10.3904(14) Å; β = 105.68(0) and Z = 4. The structural analysis shows that the presence of a layer arrangement perpendicular to the c-axis: planes of [C6H4(NH3)2]2+ cations alternated with planes of two anionic group (NO3)– anions. The cohesion of the molecular arrangement is ensured by hydrogen bonding C–H…O and N–H…O. Hirshfeld Surface analysis of intermolecular interactions confirmed that the hydrogen bonds: C/H, H/C, H/O/H/O and H/H contacts, play a dominant role in the crystal structure of the investigated compounds. Infrared and MAS NMR spectroscopic measurements were carried out to confirm the results obtained by X-ray diffraction. In optical studies, data analysis revealed the existence of optical direct with the band gap energy equal to 5.03 eV.

The ac electrical conductivity is investigated at the frequency and temperature. The two semicircles observed in the complex impedance clearly show the contribution of the grain interior and grain boundaries to the electrical response of the material. The equivalent circuit based on the Z-View-software is proposed and the conduction mechanisms are determined. Dielectric data are analyzed using complex electrical modulus M* at various temperatures. The variation of the dielectric parameters (ε’’) is found .Moreover, the temperature dependence study of frequency exponent n (T) is investigated to explain the conduction mechanism in the different range of temperature and frequency.

Evaluating the antidiabetic activity of a novel chitosan functionalized through triazoles and carbazoles

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Diabetes is one of the most serious health problems in the world, with an increasingly high incidence and mortality rate. Numerous research studies have recently highlighted chitosan-based substances as first-rate molecules for the prevention and treatment of diabetes and its consequences. Due to its very good pharmacokinetic characteristics and chemical properties, chitosan represents an attractive carbohydrate biopolymer with great biomedical potential. Chitosan derivatives incorporating heterocyclic groups have attracted much interest, especially triazole compounds, which are very valuable due to their wide range of biological activities.

This work presents the successful synthesis and characterization of a chitosan derivative synthesized by click chemistry, for biological purposes such as antidiabetic activity. This material was soluble in common organic solvents. Its composition was validated by XPS and IR-FT. An analysis of its anti-diabetic activity was performed in vitro and by molecular docking.

Key words: chitosan, carbazole, triazole, click chemistry, anti-diabetic activity

Kinetic Analysis of the Influence of Amines Addition to Substituted Benzylidenemalonates in Acetonitrile

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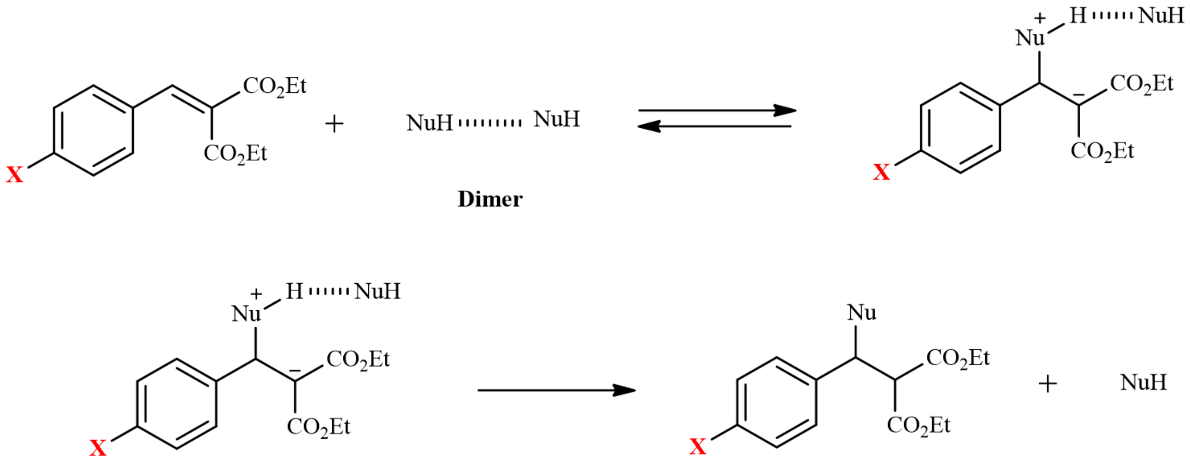
Kinetic studies of reactions between substituted benzylidenemalonates (X = $N(CH_3)_2$, OCH_3, and CH_3) and cyclic secondary amines have been investigated in acetonitrile at 20 °C.

A quadratic dependence of the pseudo-first-order rate constants (k_{obsd}) versus amines concentrations has been observed and has been interpreted in terms of a "dimer nucleophile mechanism" with the formation of a zwitterionic intermediate.

Analysis of the kinetic measurements using the Brönsted relationship shows that β_{nuc} values remain remarkably constant for changes in the nature of the substituent X. The finding of a positive ρ values for the Hammett plot are in perfect agreement with the development of a negative charge on the olefins in the transition state.



Keywords: Michael Acceptors / Reactivity / Dimer Nucleophile Mechanism / Zwitterionic Intermediate / Kinetic.

Semiconducting biomaterial based on chitosan for fluorescent sensing application

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The field of biosensors and chemosensors, ranging from biomedical to environmental applications, has grown over the past two decades. In fact, in all of these areas, there is a continuously increasing request for rapid response, usable devices, and inexpensive analyses.
In this context, the proposed contribution covers the design of new fluorescent biopolymer based on chitosan containing conjugated moities in the side chain for heavy metal sensing application. The elaborated biomaterial contains a highly emissive conjugated system derivative on PPV and triazole group in their side chain. The synthesized polymer was obtained following a series of chemical modifications on the alcohol groups of chitosan after protection of the amine function. The different modifications were confirmed by Infra Red spectroscopy and the structure of the final polymer was characterized by 1H NMR spectroscopy. The modification effect was studied by analyzing of the thermal behavior of chitosan and its analogue modified. The synthesized polymer was investigated as flourescent sensors. The changes in the photoluminescence intensity were used to evaluate the binding affinity of the semiconducting material to different metal ions. The obtained results showed considerable change in photoluminescence responses with a short time after adding the cations to modified chitosan solutions with good sensitivity .

Keywords: Chitosan; Biopolymer semiconductors, Click chemistry, Fluorescent chemosensor.

Extraction, structural characterization and biological properties of polysaccharides from food waste: A review

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Recently, the recovery of agro- residues food represents an attractive economic option as food wastage was becoming a critical problem around the globe due to the continuous increase in the world population. Indeed, the exponential growth in food waste is imposing serious threats such as health risk and environmental pollution. Therefore, numerous studies are now exploring the possibility of the transformation of bioactive compounds, mostly polysaccharides, isolated from food waste into ingredients that can be incorporated in various pharmaceutical, food or cosmetic products. Previous studies have shown that polysaccharides are very important biologically active compounds of food waste, with numerous biological activities effects. The main purpose of this review is to appraise available literature describing the extraction, purification, structural characterizations and biological properties of polysaccharides isolated from food waste. This review also provides a foundation for the further investigation, production and application of these polysaccharides as functional foods and therapeutic agents.

Key words: Food waste; Polysaccharides; Extraction; Physicochemical characterizations; Biological activities

Effect of content and aspect ratio of cellulosic fillers on the mechanical properties of composites based on biodegradable polymers

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Several biodegradable polymers, such as polyesters, have been extensively investigated for many short term applications [1,2]. Among these, poly (butylene adipate-co-terephthalate) (PBAT) has received attention as matrix for biocomposite materials owing to its ductility, flexibility, biodegradability and easy processing. However, weak mechanical properties of PBAT has led to many research studies on adding cellulosic fillers to polyesters to develop composites with enhanced properties in order to make them suitable for more applications. Thus, processing, aspect ratio of the filler and many other characteristics might strongly affect the dispersion of fillers in the polymer matrix leading to the formation of a three-dimensional network and improving the modulus.

This work aims at getting a better understanding of the effect of various cellulosic fillers, micro or nano-fibrillated cellulose, cellulose nanocrystals, and lignocellulosic fillers, with different sizes, aspect ratios, and contents on composites of PBAT.

Keywords: cellulosic fillers, polyester, composites, aspect ratio

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Alginate-Hydroxyapatites Bio-composite Materials for the Effective Removal of Rhodamine B Dye from Water

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Hydroxyapatite-Alginate bio-composites with different bio-polymer contents (0%, 10%, 25% and 50%) were prepared according to an eco-friendly process using low-cost precursors. The prepared materials were subjected to characterizations by Fourier Transform Infrared (FT-IR), X-ray diffraction (XRD), Scanning Electron Microscopy coupled with Energy Dispersive X-ray spectroscopy (SEM-EDS) and physisorption of N_2 techniques. Then, tested as sorbents for Rhodamine B dye under different sets of experimental conditions, including initial pH, contact time, initial dye concentration and temperature. The aim was to investigate the effects of these parameters on the extent of dye removal and to understand the adsorption behaviour of the composites under various conditions. The dye adsorption equilibrium is reached after 20 min of contact for the unmodified hydroxyapatite, being attained within a few minutes for the composite samples. The equilibrium data were analysed by different isotherm models, with the Freundlich model providing the best fit. Accordingly, the maximum adsorption capacity increased from 225 to 289 mg g^{-1} by the grafting effect, suggestion the potential use of these materials in wastewater treatment. Furthermore, the recoverability investigation, showed that about 98% of the removal rate can be retained after four regeneration cycles, suggesting an excellent recyclability and sustainability. Hence, these bio-composites offer broad application prospects in the field of environmental restoration.

Keywords: Hydroxyapatite-Alginate bio-composites; eco-friendly; low-cost, Rhodamine B; adsorption.

An Efficient Synthesis of Phthalimides and Their Biological Activities

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Practical and efficient synthesis of phthalimides compounds **3** were described and characterized. The synthesized compounds were screened for their antimicrobial activities against gram-positive bacterial strains (Micrococcus luteus, Listeria monocytogenes, Staphylococcus aureus and Bacillus cereus), a gram-negative bacterial strain (Salmonella typhimurium) and a fungus (Candida albicans). Cytotoxicity studies of the of phthalimides **3** were conducted in two human cancer cell lines, MDA-MB-231 and MCF-7 [1].

Key words: phthalimides; Antimicrobial; Anticancer activities

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Random polydepsipeptides based on L-valine and ε-caprolactone by direct melt copolymerization

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A series of random polydepsipeptides based on ε-caprolactone and L-valine (PCLV)s were synthesized by a direct melt polycondensation method. Their structure was fully characterized by nuclear magnetic resonance and infrared spectroscopy analyses. The resulting copolymers are completely amorphous. These (PCLV)s present increasing glass transition temperatures at increasing amino acids contents and exhibit fairly good thermal stability. Due to their physicochemical characteristics, this class of copolymers might be worthwhile to be investigated for biomedical applications.

Keywords*:* Polydepsipeptides, L-Valine, ε-Caprolactone, Melt polycondensation.

Efficient synthetic protocols in acetalization of glycerol with benzaldehyde in the presence of silica gel

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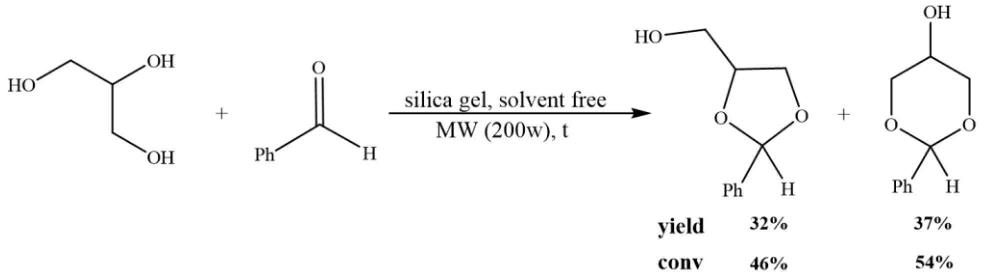
Glycerol is a non-toxic, biodegradable, and recyclable liquid, highly inert, stable, and compatible with many other non-toxic and non-irritating chemicals. It's employed as an alternative green reaction medium in various carbonyl reductions. The high polarity of glycerol allowed to achieve a simple enantioselective with high yields of cyclic ketals under microwave-assisted conditions.

Glycerol allows excellent acoustic cavitation even at high temperatures (70-100 °C), Herein, the reaction yields to two isomeric products namely, a five membered heterocycles and six membered cyclesas 1,3-dioxlaneand 1,3-dioxane.Comparative studies with conventional heating under autogenously pressure of the autoclavesuggest without solvent that microwave irradiation plays a crucial role in acetalization reactions.



Scheme: Acetalization of glycerolwith benzaldehyde in the presence of silica gel.

Key words: Green chemistry, Glycerol, Heterogeneous Catalysis

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Virtual screening, design, and synthesis of new pheromones for trapping *Ceratitis capitata*

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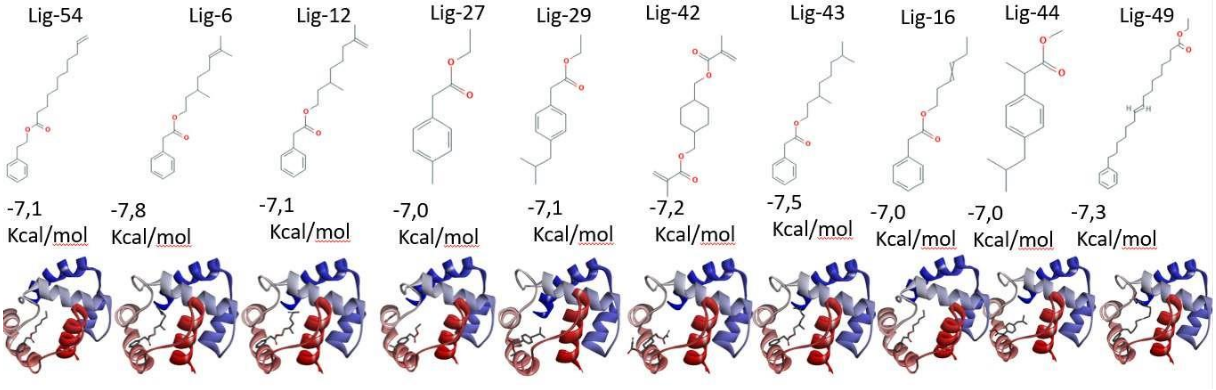
Pest insects, such as the *Ceratitis capitata*, pose a significant threat to global agriculture. Current methods of controlling these insects primarily rely on the use of synthetic pesticides. However, repeated use of these chemical products can lead to the development of resistance in insects, making their control more challenging and posing risks to the environment and human health.

In this context, the general objective of this work is to develop an innovative alternative strategy for controlling *Ceratitis capitata*. To achieve this, the project focus on designing pheromones for traps to monitor and control *Ceratitis capitata*. Sexual pheromones are natural compounds produced by female insects that attract males and can be used to trap insects and limit their spread. We have designed and synthesized new, more efficient and specific pheromones for *Ceratitis capitata*. After identifying the sexual pheromone receptor in the fruit fly and modeling its three-dimensional structure, we were also able to model the 3D structures of the three existing sexual attractants on the market: trimedlure (TML), cue lure (CL), and methyl eugenol (ME). Using molecular docking, we identified the binding site of these three attractants in the intra-helical pocket of the receptor. We then prepared a database of 260 chemical molecules extracted from the PubChem database. The goal of this database was to conduct virtual screening and select molecules with the ability to bind to the target (pheromone binding site) with very high affinity. We performed virtual docking and analyzed the results to compare the affinities of each molecule with those of the three commercial sexual attractants. This analysis allowed us to select the 10 best molecules with a strong affinity for the pheromone binding site.

Finally, we synthesized 5 molecules to evaluate their ability to attract male *Ceratitis capitata*. We hope to design new, more efficient and specific pheromones for *Ceratitis capitata*, which could have a significant impact on the control and management of populations of this harmful species.



Degradation of ortho-methyl phenol by anodic oxidation

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Ortho methyl phenol is used in various fields such as the synthesis of resins, pesticides, plastic antoxydants and polymerization inhibitors, as will as in the preparation of pharmaceuticals and dyes. The Orho methyl phenol was selected as target pollutant and the oxidative degradation was ensured by hydroxyl radicals generated. Electrochemical degradation of ortho methyl phenol has been extensively studied in an undivided electrolytic cell. The removal of ortho methyl phenol was studied as a function of pH, effect of current density and effect of electrolytes support. Mass spectrometry was employed to identify major transformation by-products of ortho methyl phenol electrochemical degradation.

Augmentation in proton conductivity of crosslinked carboxymethyl cellulose through the introduction of oxidized poly(vinyl alcohol) doped in lithium sulphate

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The effect of doping lithium sulfate (Li_2SO_4) salt onto a composite matrix of carboxymethyl cellulose (CMC) and poly(vinyl alcohol) (OPVA). Ester formation approach was used to prepare solid polymer electrolyte (SPE) films for the first time. The films were characterized by Fourier-transform infrared spectroscopy (FTIR), X-Ray diffraction (XRD), electrical impedance spectroscopy, thermogravimetric analysis (TGA), and Scanning electron microscopy (SEM). FTIR technique confirmed the ester formation between two polymers matrix as well as the formation of the coordination bond between Li^+ and ester group and via hydrogen bonding. XRD showed that Li_2SO_4 incorporation decreased the crystallinity of CMC/OPVA-based SPE. The composite with 20 wt% Li_2SO_4 showed the highest conductivity of 77 mS cm^{-1}, strongly influenced by the highest charge concentration (n), not its mobility (μ). TGA studies showed a decrease in thermal stability with salt incorporation. The transference number was found to be 0.99 for the highest conducting sample showing the primary charge carriers are ions. The highest conducting sample exhibited a mechanical strength of 950 MPa at room temperature, and it has been used to fabricate a battery to evaluate its suitability in energy storage devices.

Crystal structure, thermal analysis, Hirschfeld surfaces, electrical and semiconducting properties of the new square pyramidal copper(II) complex [Cu($C_{10}H_{24}N_4$)Br]Br.

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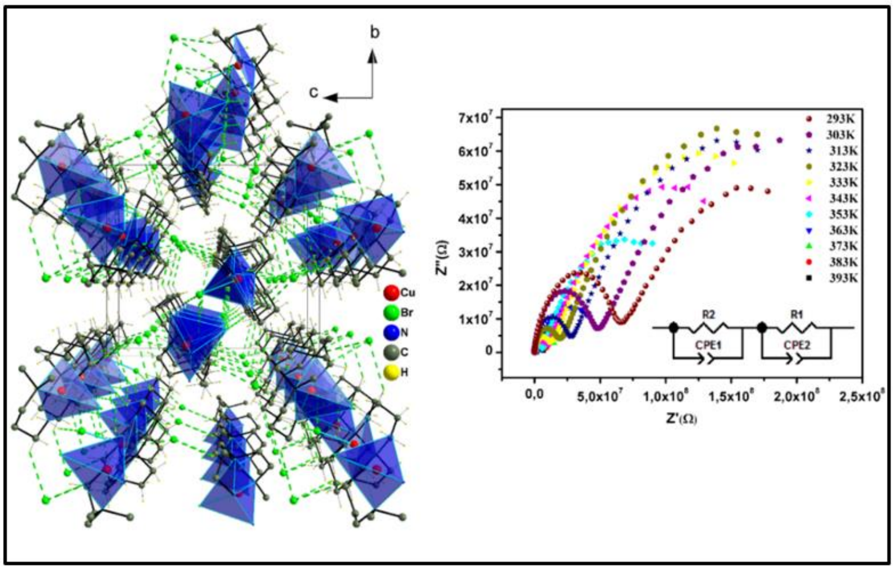
A new organic-inorganic Cu(II) bromide complex material [Cu($C_{10}H_{24}N_4$)Br]Br has been synthesized by hydrothermal method. Blue-violet crystals are characterized by X-ray single crystal diffraction, crystallizing in the orthorhombic system, non-centrosymmetric space group $P2_12_12_1$. This study shows that the Cu(II) sites adopt a square pyramidal distorted geometry. The crystal structure first reveals a one-dimensional (1D) network along the *a* axis based on N–H···Br interactions. The dimensionality is further increased to (3D) by C–H···Br weak interactions. Hirshfeld surfaces analysis was used to study the intermolecular interactions in the crystal lattices. It was then found that X-H···Br (X = N or C) contacts play an important role within the atomic architecture. Besides, the phase transitions, electric and optical properties of [Cu($C_{10}H_{24}N_4$)Br]Br were investigated and revealed a phase transition at T=343 K. The temperature dependence of the electrical conductivity confirmed the phase transition that was also well detected with differential scanning calorimetry. The calculated activation energies of the conduction process for the two phases are Ea_I=0,30 eV, and Ea_{II}=0,69 eV.



Fabrication and characterization of graphene/sulfonated polyether sulfone octyl sulfonamide hybrid film with improved proton conductivity performance

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In this study, graphene (G) was blended with sulfonated polyether sulfone octyl sulfonamide (SPESOS) in different ratios (1, 1.5, and 2 wt.%) to enhance the proton conductivity of SPESOS. The results of the water absorption analysis and current impedance spectroscopy of a G/SPESOS hybrid film showed that the proton conductivity improved due to the hydrophilic-hydrophobic nature of the hybrid. Further analysis showed that the synthesized hybrid film had a desirable contact angle and good ion exchange capacity, water absorption, and thermal stability. The hybrid film with 2 wt.% graphene showed better proton conductivity (92 mS/cm) than the pristine SPESOS film (34 mS/cm) at 100% relative humidity. These results suggested that the synthesized hybrid films offered superior proton conductivity, ion exchange capacity, and hydrophilicity compared to pristine SPESOS.

Keywords: Proton conductivity, Graphene, SPESOS film, Hybrid film, Fuel cells

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Structural, Optical, and Spectroscopic Characterization of Hybrid Material (C6H16N2O)[CdCl1.90I2.10]

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The crystal structure of partial substituted compound 4-(2- ammonioethyl) morpholin-4-ium dichloridodiiodidocadmate/chloridotriiodidocadmate (0.90/0.10) as monoclinic $P2_1/c$, with $a = 6.7773(14)\text{Å}$, $b = 13.870(3)\text{Å}$, $c = 16.104(3)\text{Å}$; $V = 1510.5(5)\text{Å}^3$. The molecular arrangement of the crystal consists of one-dimensional (1D) cationic chain $[NH_3(CH_2)_2NH(CH_2)_4O]^{2+}$ linked via N-H…O hydrogen bonds extending parallel to the c axis and an isolated $[CdCl_{1.90}I_{2.10}]^{2-}$ tetrahalidocadmate anions; which are interconnected via N-H… Cl and C-H…Cl(I) hydrogen ensuring the formation of a three-dimensional (3D) network. Infrared spectroscopy confirms the presence of the organic moiety in the structure. Hirshfeld surface analysis reveals the significance of hydrogen bonds and electrostatic interactions in the material cohesion, while 2D fingerprint plots indicate the contributions of the H...Cl and H…H intermolecular interactions. The material also displays diffuse absorption, indicating the existence of optical direct allowed transition mechanisms with the band gap energy equal to 3.19 eV.

Keywords: Organic-inorganic hybrid material; Single crystal X-ray diffraction; Crystal structure; Hirshfeld surface, Vibrational study, Optical absorption.

Carboxymethyl cellulose from *Opuntia ficus-indica* (Cactaceae) for film production

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Opuntia ficus-indica (Cactaceae) was used as a cellulose source for producing carboxymethyl cellulose-based film (CMC). The individualized cellulose fibers were extracted from *Opuntia ficus-indica* using a soft delignification process based on treatment with sodium hydroxide/hydrogen peroxide mixtures followed by mechanical grinding operation. The extracted cellulose fibers were carboxymethylated using two steps: an alkalization pre-treatment and an etherification reaction. The CMC-films were synthesized based on high-quality carboxymethyl cellulose cross-linked with polyol acid. The produced CMC-films have various morphological structures, acceptable mechanical properties, and improved barrier behaviors.

Key words: *Opuntia ficus-indica*, carboxymethyl cellulose, film, mechanical properties.

Poly(3,4-éthylènedioxythiophène) based electrochemical sensor for multiple detections of mercury (II), lead (II), and arsenic (III) in water samples.

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Heavy metals water pollution has become a major global concern due to its detrimental effects on both human health and the environment. Recent statistics reveal that 40% of the world's lakes and rivers are affected by heavy metal contamination [1]. Heavy metals have the tendency to bioaccumulate in living organisms and food chains, leading to various serious damage to organs and even neurodegenerative disorders like Alzheimer's and Parkinson's diseases [1]. As a result, there is a high demand for the accurate detection of heavy metals at trace levels. This work describes the development of a Poly(3,4-éthylènedioxythiophène) (PEDOT) based electrochemical sensor for the determination of mercury (II), lead (II), and arsenic (III) in different water matrices. To meet this demand, the screen-printed carbon electrode was modified with a series of materials, including a graphitic carbon nitride (g-C3N4) thin film, a PEDOT polymer, and a two-dimensional molybdenum trioxide nanomaterial. Besides, the sensing process was monitored using the anodic stripping voltammetry method. The electrochemical findings revealed that the electrochemical sensor has the ability to simultaneously detect the target heavy metals over a wide linear range of 0.01–10 μM, with a remarkably low limit of detection of 3.7 nM. In addition, the applicability of the sensor was assessed in detecting the aforementioned heavy metals in tap, river, and sea waters.

Keywords: two-dimensional nanomaterials; electrochemical polymerization; heavy metals; water pollution; electrochemical sensing.

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Preparation and application of Tunisian phosphogypsum as fillers in papermaking made from *Prunus amygdalus* and *Tamarisk* sp

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Large mineral fillers have long been used in papermaking for many reasons. The finish of the writing and printing paper depends on using the fillers as internal or surface treatments. During this study, **Tamarisk** sp. and **Prunus amygdalus** pulp-filled papers with raw phosphogypsum (PG) and calcined PG (CPG) at different percentages were studied. First, the prepared minerals (treated and untreated ones) were characterized by different analytical methods such as SEM and EDS. Subsequently, different handsheets with a basis weight 60 g^{-2} were prepared on a Rapid Khöten sheet former following the standard method. The added amounts of PG and CPG fillers were included from 0% to 15% based on the pulp. The effects of incorporation as well as the quality fillers into physical and optical properties were assessed. It can be deduced that the incorporation of CPG at 800 °C improved filler retention by as high as 92%, and the optical properties of the filled paper was strikingly enhanced, while the strength properties were practically negatively influenced. It was clear that calcinations steps reduce the fiber–filler–fiber bond. Thus, results are in accordance with the SEM observation, which confirmed the obtained physical properties.

Keywords: phosphogypsum, papermaking, cellulosic fibers, mineral fillers.

Synthesis of Luffa cylindrica-polyaniline composite for dyes removal

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Water pollution by toxic dye is a serious environmental issue throughout the world today. Many industries like textile, printing, leather, paper, etc. release a large amount of colored effluent to wastewater. All organic dyes that are toxic and nonbiodegradable cause several serious human health problems. Hence, carcinogenic dyes need to be removed from industrial wastewater to solve ecological, biological, and environmental problems. To remove hazardous dyes from wastewater, many techniques have been developed, like chemical, physical, biological, etc. Among them, the physical adsorption technique is considered one of the most effective methods due to its easy handling, high efficiency, and simplicity. Several efficient adsorbents such as polymers, supramolecular gel, etc. have been used for organic dye adsorption from industrial wastewater. However, the design of an efficient adsorbent is still undergoing challenge in the sense of product cost, eco-friendliness, easy disposal, and reusability for the separation of toxic dye. Actually, polymers have some advantages, like a large number of adsorbent sites, good environmental stability, durability, etc. We have chosen polyaniline (PANI), one of the conjugated polymers due to its easy synthesis, low production cost, eco-friendliness, good environmental and thermal stability.

In this work, The coating of the fibrous skeleton of luffa cylindrica (LC) with polyaniline (PANI) was carried out by in-situ polymerization of aniline. A thin PANI layer in its emeraldine-salt form (ES) got bound on to the LC surface, as revealed by the green color the latter developed, procuring more roughness to the luffa fibers. The surfaces of both materials, i.e. the purified original luffa (LC) and the PANI-coated luffa (PANI/LC) were characterized by FTIR, completed by the Raman range, SEM/EDX and XRD. Then, the novel synthetized material displayed a high efficiency to retain the methylene blue and methyl orange pollutants. The adsorption parameters were examined. The dyes uptake process and the computed thermodynamic parameters ($\Delta H°$, $\Delta S°$ and $\Delta G°$) were determined.

Sensitive ion imprinted polyaniline electrochemical platform for the multiple sensing of lead (II).

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The World Health Organization has identified lead, as a highly hazardous heavy metal ion that poses serious risks to both human and aquatic life. Its presence in water is a major concern, as even low concentrations can lead to toxicity in the human body [1]. Therefore, it is crucial to detect this metal ion in water samples to ensure the safety of human and aquatic ecosystems. Herein, an electrochemical platform based on screen-printed carbon electrode, which utilizes a reduced graphene oxide-tungsten disulfide thin film functionalized with ion-imprinted polyaniline (PANI), has been developed to accurately detect lead (II) concentrations in different water samples. The 2D nanocomposite, rGO-WS2 thin film, was prepared using a hydrothermal method, while the lead (II)-imprinted aniline polymer was obtained through an electrochemical approach. The electrochemical outcomes have shown that the platform is highly effective in identifying the presence of Pb(II). Indeed, the obtained differential pulse voltammograms showed the presence of a proportional decrease in the oxidation current of PANI with the increase of the Pb(II) concentration in a linear range of 0.1–20 ng mL^{-1} ($r^2 = 0.9957$) with a limit of detection of 0.03 ng mL^{-1} (at $S/N = 3$). Besides, the platform also exhibited excellent selectivity, repeatability, reproducibility, and storage stability. Real sensing tests were conducted using spiked samples of river and tap waters to evaluate the platform's applicability. The results showed excellent recovery rates ranging from 98.7% to 101.9%.

Keywords: two-dimensional nanocomposites, polyaniline, electrochemical polymerization, sensing, water pollution.

Electrosynthesis of Quinoleines and Indolines by Electroreduction of Substituted Nitrobenzenes

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The electrochemical reduction at potential controlled for substituted nitrobenzenes was used for the preparation of nitrogen heterocyclic compounds.

The first part of this work is devoted to obtaining derivatives of hydrazine in acidic medium (pH = 0) and slightly acidic medium (pH = 4.75), and azoxy derivatives in basic medium (pH = 9.25) from derivatives of p-nitrohydrocinnamic acid. However, the existence of 1 - (3 - (4-nitrophenyl) propanoyl) urea and 6-hydroxy-2 ,3-dihydroindénone-1were observed in the case of ester derivative in acetic buffer medium. These products are obtained by the electroreduction on the landing of the first polarographic wave. Furthermore, the electro-electrolysis at more negative potentials leads only to its corresponding amino derivatives.

The second part shows that it is possible to access N-hydroxyquinolinone-2, 2- amino, N-hydroxyquinoline, hydroquinoline derivatives, indoline carboxylic acid-2 and azoxy derivatives by reduction of derivatives of o-nitrohydrocinnamic acid, and this for the first and second wave.

In the third part, we studied the electrochemical behavior of the acid of 2,3- bis (2-nitrophenyl) acrylic acid and 2,3-bis (2-nitrophenyl) acrylonitrile.

Finally, the electrolysis we have achieved, we have verified the functions of the polarographic waves and propose a mechanism for each reaction product obtained.

Key words : Electroreduction, Quinoleine, Indoline, Hydroxy quinolinone,Azoxy bi phenyle.

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Optimization, Synthesis and N-Arylation of Amides by Unconventional Way

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The amide bond is widely present in pharmaceutical intermediates and natural products, and about 25% of the known clinical drugs contain at least one amide bond.[1] Thus, the thermal amidation of carboxylic acids with amines is a potential complementary procedure to eliminate some of the reported synthetic challenges. This reaction has been neglected for many years principally because of the long reaction times and high temperatures needed.[2, 3]

Currently, microwave irradiation has proven to be efficient at reducing the reaction times in many organic transformations. Furthermore, previous work reported by Loupy and co-workers [4] showed the first microwave-assisted synthesis of amides from carboxylic acids.

For our part, and firstly, we optimized, by unconventional way, the obtaining of the N-acylation of aniline by acetic acid, then secondly, the N-acylation was carried out on different aromatic amines. Then, the N-arylation was performed on the different amides formed.

The proton and carbon 13 NMR as well as the melting point were the methods for characterizing the products obtained.

Key words: amine, acetic acid, N-acylation, unconventional way, N-arylation

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Michael addition of activated methylene's on 2,6-bis((E)-benzylidene)cyclohexan-1-one derivatives

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Michael addition reaction is an important method used to create carbon-carbon bond[1]. In addition, compounds bearing an α,β-unsaturated carbonyl system are known to be highly reactive which act as Michael acceptors[2].

Dibenzylideneacetone (DBA) derivatives exhibit a broad spectrum of biological activity, such as anticancer[3], antibacterial[4], and antiparasitic[5] activities. These derivatives have also shown high reactivity as Michael acceptor in conjugate addition reactions towards activated methylene[6]. In this perspective, we interested in studying the reactivity of these compounds towards malononitrile and ethyl cyanoacetate. The obtained results showed that the reaction between DBA derivatives and activated methylene leads to the formation of 2-amino-4-arylpyrans bearing a styrene unit. The structures of the synthesized compounds were established using usual spectroscopic techniques.

Keywords: Michael addition, α,β-unsaturated ketone, activated methylene, pyrans.

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Sea cucumber and brown algae from Tunisian Seashore, sustainable sources of chondroitin sulfates and bioactive polysaccharides for health and well being

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Chondroitin sulfates are sulfated glycosaminoglycans which are used in the pharmaceutical, cosmetic and nutraceutical sectors as proregenerative compounds or dietary chondroprotective supplements. Unfortunately, industrial production from bovine or avian sources faces sanitary risks (1). Our study focuses on an unusual alternative source of chondroitine sulfates from Tunisan seashore: *Holothuria polii* (*H. polii*), echinoderms that naturally produce chondroitin sulfates in their coelomic fluids and teguments (2). Thus, our work aim to study some biological activities of chondroitin sulfates extracted from the coelomic fluid (PFH, Polysaccaride Fluid Holothuria) and from the teguments (PHP, Polysaccharides Holothuria polii) of *H. polii* and compare the results to a high molecular weight Fucan (Fuc, from the brown algae, *Sargassum vulgare*) (3). We followed the effects of these polysaccharides on parameters involved in tissue repair: cell proliferation of human dermal fibroblasts in 2D culture and secretion of matrix metalloprotease (MMP) by dermal fibroblasts in 2D culture and by reconstructed connective tissue through zymography. Our aim was to determine if chondroitin sulfates from *H.polii* have the same properties as those currently produced in the industry. This way, we can determine if they can be regarded as an alternative source of chondroitin sulfate from a more sustainable production with less sanitary risks.

Key words: Chondroitin sulfates, Fucan, Human dermal fibroblasts, Matrix metalloproteases, Zymography.

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Effect of phosphorylated modification on the antioxidant and analgesic potentials of polysaccharides extracted from Chard (*Beta vulgaris*)

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Phosphorylation is a key route to achieve varieties of biological activities for polysaccharides. In this study, we aim to investigate the physiochemical and biological properties of phosphorylated polysaccharides (P-PBV) obtained from a natural polysaccharide (PBV) extracted from Chard (*Beta vulgaris*). A series of physico-chemical properties were determined, including chemical composition, FT-IR spectrum, ^{13}C NMR and ^{31}P NMR spectra, RX analysis, molecular weight, and degree of substitution (DS). The results showed that the phosphorylated modification of polysaccharide were successful. To investigate the antioxidant activity of P-PBV, we determined the scavenging activity of DPPH and ABTS, as well as the reducing power. Additionally, analgesic activity, including peripheral and central assays, was performed to determine the antinociceptive effects of polysaccharide and its phosphorylated derivative. Thus, data showed that the phosphorylation had a significant increase in the antioxidant properties, compared with the native polysaccharides. Moreover, the phosphorylated derivative had stronger peripheral as well as central antinociceptive effects.

Key words: Chard Polysaccharides; Extraction; Phosphorylation; Physico-chemical characterization; Antioxidant and analgesic effects.

Biobased plasticizers on PLA/PCL behavior

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Keywords: PLA, PCL, Blends, biobased, plasticizers

The strategy of this present work is to investigate the effect of biobased plasticizers on Polylactic acid and Polycaprolactone (PLA/PCL) blends. The research focuses on the use of epoxidized sunflower oil (ESO). Films were prepared by solution casting. The FTIR spectroscopy results show an interaction between PLA, PCL, and ESO. Therefore, it can be explained by the formation of hydrogen bonding between the ester groups of PLA and the oxirane groups which were formed by epoxidation in sunflower oil (SO) [1-2]. In fact, the plasticized blends exhibit higher flexible mechanical properties. Thus, the addition of ESO improved the miscibility of the PLA/PCL blends by dilution effect [3].

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Synthesis, characterization and antioxidant activity of Michael adduct obtained through the 1,4-addition of activated methylene compounds on atlantones isolated from *Cedrus atlantica* essential oil

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Compounds containing α,β-unsaturated carbonyl system are very interesting intermediates in organic synthesis, which allow the synthesis of a wide spectrum of compounds endowed with attractive applications[1,2]. In addition, the Michael addition reaction is one of the most fundamental methods for the formation of new carbon-carbon and carbon-heteroatom bonds[3]. Michael donors such as malononitrile, ethyl cyanoacetate, ethyl malonate, ethyl acetoacetate react with α, β-unsaturated ketones via an 1,4-addition to result in a variety of compounds with therapeutic purpose.

In the continuation of our ongoing research work[4,5], this work is devoted to study the reactivity of atlantones, isolated from *Cedrus atlantica* essential oil[6], with respect to malononitrile and ethyl cyanoacetate. The structure of the obtained compounds was established using the usual spectroscopic methods: IR, NMR (^{1}H & ^{13}C). Moreover, the antioxidant property of the synthesized compounds was screened in vitro using the free DPPH scavenging assay.

Keywords: *Cedrus atlantica*, atlantones, activated methylene, Michael addition, antioxidant.

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Phosphonothioamidate in bleomycine-induced pulmonary fibrosis in rats: Experimental anti-fibrotic assessment, theoretical DFT calculations and molecular docking study

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A novel Phosphonothioamidate derivative (**EThmP**) was designed and evaluated for its ability to inhibit oxidative stress and fibrotic process. **EThmP** was used on an experimental murine model of pulmonary fibrosis induced by bleomycin (BLM). The obtained results indicate a significant decrease of superoxide dismutase activity and an increase in lipid peroxidation after BLM treatment compared to control group, while **EThmP** (10mg/kg) was able to normalize the level of these oxidative markers, decreased collagen accumulation and lung damage compared to BLM group. Furthermore, the molecular docking approach was used to model the interaction between the **EThmP** and the selected collagen peptides against anti-fibrotic disease. (**Figure 1**) [1]

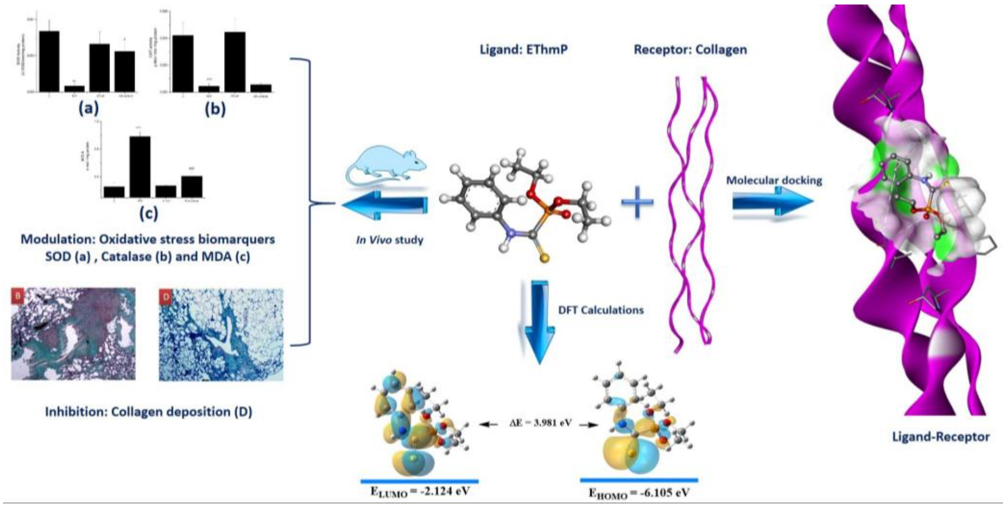

Figure 1

Keywords: EThmP, Idiopathic pulmonary fibrosis, DFT Computational chemistry, Molecular docking.

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Synthesis, characterization and in vitro biological screening of new metal complexes based on eugenol derivative

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Metal complexes based on natural ligands have fascinated great research and implementation interests because of the natural and commercial availability and eco-friendly nature. Several transition metal complexes based on caffeine [1] and omeprazole [2] as natural ligands have shown a large spectrum of biological activities. Eugenol has been also used as a ligand allowing the synthesis of a variety of highly stable metal complexes [3] endowed with a wide range of biological activities such as antifungal [4] and antibacterial [5] activities, etc.
In order to improve these biological properties, eugenol has been structurally modified by the action of monochloroacetic acid to synthesize 2-(4-allyl-2-methoxyphenoxy) acetic acid. The latter, has been used as a ligand to prepare metal complexes derivatives. The structures of the synthesized complexes have been established using usual spectroscopic techniques. Furthermore, all the synthesized complexes have been screened *in vitro* to evaluate their antibacterial and antioxidant activities.

Keywords: eugenol, metal complexes, antibacterial, antioxidant, spectroscopy.

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Energy decomposition analysis (EDA), Voronoi deformation density (VDD) and Gross Mulliken population of the interactions between diazine molecules and SO_X(x=1, 2): DFT investigation

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The most important sources of universal acidifications are sulfur oxides (SO_2 as well as SO_3) [1]. Sulfur oxides as two parts of the major pollutants can released to the atmosphere as consequence of burning of sulfur included fossil fuels in vehicle engines and households. The interaction of SO_2 with air and atmospheric humidity results the formation of SO_3 then the sulfuric acid which goes around acid rain, the metal corrosions and also ruin the statuary and stone buildings [2]. At aim to reduce its effects, many new technologies have been developed using different materials for efficient and reversible capture of SO_2 such as; limestone scrubbing[3], ammonia scrubbing[4], catalytic oxidation, double alkali process and absorption by organic solvent. Although, these technologies still have some inherent drawbacks like waste water gypsum waste, formation of by-products, volatilization of solvents, CO_2 emission etc... In the present work, our capture strategy is to make use of the σ and π-holes in sulfur oxides. (SO_3, SO_2) to interact with diazine molecules and thereby to enhance a chalcogen bond. Geometry optimization, Molecular electrostatic potential (MEP), Energy Decomposition Analysis (EDA), Voronoi deformation density (VDD) charges and Gross Mulliken populations analyses were determined to better understand the nature of the chalcogn bonding interaction between SO_x(x=1,2) and diazine molecules.

Keywords: chalcogen-bonding, σ and π-holes, noncovalent interaction, energy decomposition analysis, density functional theory

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Impact of hydrothermal treatment on *Zyziphus lotus*'s integral revalorisation

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The hydrothermal treatment of *Zyziphus lotus* was used as a pretreatment in this study, allowing for the total valorisation of this feedstock through the production of oligosaccharides, lignin, and cellulose nanofibers. First, the temperature of the hydrothermal treatment was optimized to maximize oligosaccharide production. The influence of the hydrothermal pretreatment on the efficacy of the subsequent biorefinery processes and the properties of the produced products was then investigated. The hydrothermal pretreatment not only boosted the organosolv delignification process, but it also influenced the polydispersity index and crystallinity of the produced lignins and cellulose nanofibers. Furthermore, this treatment would allow for the integral valorisation of the *Zyziphus lotus* via a biorefinery approach, which might be an example of the circular economy while also fitting the zero-waste concept.

Keywords: *Zyziphus lotus,* Oligosaccharides, lignin, cellulose nanofibers, integral biorefinery

A one pot three component synthesis of novel hybrid pyrazole-dihydropyrimidinone.

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Heterocyclic compounds are associated with diverse pharmacological activities and shown their effectiveness in medicinal treatment.[1] 3,4-Dihydropyrimidin-2(1H)-ones (DHPMs) are known to exhibit a wide range of biological activities such as antiviral, antitumour, antibacterial and anti-inflammatory actions. [2] In addition, heterocyclic nitrogen compounds, especially pyrazole derivatives, have the capacity to generate different non-covalent interactions, such as hydrophobic interactions, hydrogen bonds, van der Waals forces and dipole-dipole interactions with different biological targets, allowing a broad spectrum of biological properties. These properties include antimicrobial, anticonvulsant, anti-inflammatory, antitubercular, antibacterial and anticancer activities.[3] Therefore, the combination of two different pharmacophores can reduce side effects and overcome drug resistance because it would result in multiple mechanisms of action.[4]

A synthesis reaction of pyrazole derivative, urea with an aldehyde, affording to a pyrazole-dihydropyrimidinone compounds. The reaction was carried out in acetonitrile medium and acid catalyst. The obtained hybrids are identified by their spectral ^{1}H, ^{13}C, HMBC and HSQC 2D NMR.

Bio-based Polydepsipeptides derived from natural amino acids

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A series of random Polydepsipeptides were obtained by direct reaction of ε-caprolactone and a series of natural amino acids by melt polycondensation and a quasi-alternating polyesteramides were synthesized by melt polycondensation of an intermediate hydroxy- and ethyl ester-terminated amide. Model reactions show that the reaction between ε-caprolactone and β-alanine proceeds first by the ring opening of ε-caprolactone by the amine groups of β-alanine. The random PEAs with ε-caprolactone and β-alanine contents of 60 mol-% and above present a well defined melting endotherm corresponding to CL-rich polymer domains. The quasi-alternating PEA (ε-caprolactone content of 50 mol-%) presents a well-defined and large melting endotherm and exhibits notably higher Young's modulus and ultimate tensile strength than its random counterpart.

Keywords: Polydepsipeptides, ε-caprolactone, natural amino acids, polycondensation; microstructure; NMR.

Study of oxidative stability and cold flow properties of *Citrillus colocynthis* oil and *Camelus dromedaries* fat biodiesel blends

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Recently, biodiesel has been gaining market share against fossil-origin diesel due to its ecological benefits and because it can be directly substituted for traditional diesel oils. However, the high cost of the raw materials required to produce biodiesel make it more expensive than fossil diesel. Therefore, low-priced raw materials, such as waste cooking oil and animal fats, are of interest because they can be used to drive down the cost of biodiesel. We have produced biodiesel from camel fat using a transesterification reaction with methanol in the presence of NaOH.

Biodiesel prepared from animal fat has been gaining increasing interest in the last few years. The main drawback of biodiesel prepared from animal fat is its poor low-temperature performance, which limits its use in cold climates. This study proposes a method of improving the low-temperature properties of young *Camelus dromedaries* (Hachi) fat biodiesel (HB) and improving select fuel properties [e.g., the cetane number and oxidative stability] of *Citrullus colocynthis* biodiesel (CCB), which has a high iodine value. HB and CCB were blended in different volume ratios and the fatty acid methyl ester composition and fuel properties of the biodiesel blends were evaluated according to the American Society for Testing and Materials (ASTM) methods.

The results of our study demonstrate that blending the biodiesel from Hachi fat and *C. colocynthis* seed oil provides a suitable alternative to biodiesel prepared using food crops.

Key words: Hachi fat, *Citrullus colocynthis* seed oil, Transesterification, Alkali catalyst, Fuel properties, Biodiesel blend

Electrochemical impedance spectroscopy detection of heavy metal ions using a partially biobased poly (pyridine ether) films.

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A variety of fluorinated polyetherpyridines prepared by polycondensation of pentafluoropyridine previously synthesized with bisphenol A or isosorbide as a biosourced diol were prepared. The characterization was carried out by HMR H and F spectroscopy and the molecular weights were determined by GPC. The chemical sensors were grown to detect divalent metal ions (Pb^{2+}, Cd^{2+}, Ni^{2+} and Hg^{2+}) by modifying the gold electrode with four partially biobased poly(pyridine ether) polymers[1]. The biobased poly(pyridine ether) functionalized with isosorbide gave the best analytical response, with a good linear performance for all four heavy metals, showing a higher sensitivity for Pb^{2+} ions in a wide range of concentrations from 5×10^{-11} to 5×10^{-7} M.

Keywords: Bio-based poly (pyridine ether) · Heavy metals · Detection

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Structural characterization of polysaccharides from *Coriandrum sativum* seeds: Hepatoprotective effect against cadmium toxicity *in vivo*

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Coriandrum sativum is one of the most widespread curative plants in the world, being vastly cultivated in arid and semi-arid regions as one of the oldest spice plants. This present work aims to extract the polysaccharides from coriander seeds and evaluate their antioxidant potentials and hepatoprotective effects in vivo. The polysaccharide from coriander seeds was extracted, and the structural characterization was performed by FT-IR, UV–vis, DSC, NMR (1D and 2D), GC-MS, and SEC analysis [1]. Polysaccharide extraction from coriander (CPS) seeds was characterized to evaluate its antioxidant and hepatoprotective capacities in rats. Results showed that CPS was composed of arabinose, rhamnose, xylose, mannose, fructose, galactose, and glucose in molar percentages of 6.2 %, 3.6 %, 8.8 %, 17.7 %, 5.2 %, 32.9 %, and 25.6 %, respectively. Further, CPS significantly hindered cadmium-induced oxidation damage and exercised a protective effect against Cd hepatocytotoxicity, with a considerable reduction of MDA production and interesting CAT and SOD enzyme levels. Results suggest that CPS might be employed as a natural antioxidant source.

Key words: *Coriandrum sativum*; polysaccharide; physicochemical characterizations; antioxidant capacities; hepatocytotoxicity.

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Quantification of the electrophilic carbon reactivity of a nitropyridinic derivative

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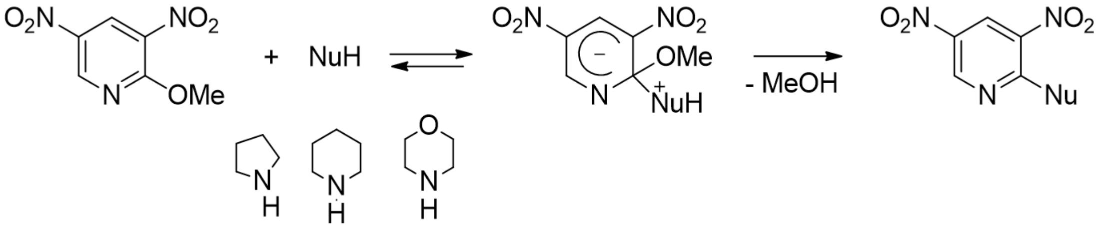
Kinetics of the reaction of 2-methoxy-3,5-dinitropyridine with three secondary amines (pyrrolidine, piperidine and morpholine) was studied spectrophotometrically in acetonitrile at 20 °C. The second-order rate constants have been used to evaluate the electrophilicity parameter *E* of 2-methoxy-3,5-dinitropyridine according to the linear free energy relationship : log k (20 °C) = s (*N* + *E*) where N and s_N are nucleophile-specific parameters. However, the Brønsted-type plot is linear with β_{nuc} = 0.70 for 2-methoxy-3,5-dinitropyridine, indicating that the reaction proceeds through a S_NAr mechanism in which the first step is the rate-determining step.



Scheme1.Thereactionof2-methoxy-3,5-dinitropyridinewithsecondaryaminesin CH_3CN at 20°C

Key words: Kinetics / electrophile / nucleophilicity / electrophilicity / S_NAr / Mayr's equation.

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Study of the Reactivity of Diphenylcarbazone towards Uranium (VI)

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In this work, we studied the reactivity of diphenylcarbazone ($C_{13}H_{12}N_4O$) noted H_2L, on an aqueous solution of uranium (VI). A single complex of monomeric nature and of formula $\mathbf{UO_2\ (H_2\ L)(OH)_2\ ].1/2\ H_2\ O}$ noted C1 , was isolated. This compound was characterised by different methods: elemental analysis, molar conductivity IR spectroscopy, proton NMR, carbon NMR and UV-visible spectroscopy.

The uranium complexes that was isolated and characterised has a structure and stability that appeared to be determined, essentially, by the size of the coordinates.

These results obtained show, contrary to what was generally accepted, that steric factors alone should not be taken into account to explain and predict the structure and stability of organometallic uranium complexes. The electron density of these compounds must not exceed a limit value. A consequence of this is that the synthesis of sterically unsaturated complexes will be facilitated by the use of electron donor ligands.

Keywords: Diphenylcarbazone, uranium complexes.

Natural fibers as adsorbents for wastewater treatment

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Water safety and security are global problems. So, many efforts have been directed to find alternative ways of treating wastewater. Indeed, the discharge of synthetic dyes into industrial effluents has undesirable impacts on the environment. These dyes are used in several sectors: printing, food products, cosmetics and especially in the textile industries. Biosorption techniques have been shown to be an effective alternative. The search for new abundant natural adsorbents for wastewater treatment is still a great challenge.

This work proposes a simple and effective method of decolorizing water using chemically modified natural cellulosic fibers. First, simple surface chemical modifications were applied to natural cellulosic fibers. Native and chemically modified cellulose fibers were characterized in terms of surface chemistry and morphology. Then, engaged in the biosorption of ionic anthraquinone dye as organic pollutant. Our study was carried out according to several parameters: temperature, pH and contact time to find out the optimal adsorption conditions and to understand the behavior of dyes at the interface of cellulosic fibers. The modified fibers exhibited better affinity than native cellulose toward the dye due to the existence of amine groups. The chemical amination of hydroxyl groups of cellulose has shown positive change on their surface properties and produce better absorbent materials.

Keywords: Natural Fibers, Synthetic Dyes, Biosorption, Wastewater Treatment.

The Facile Hydrolysis of Imidazolinium Chlorides Under Basic Aqueous Conditions

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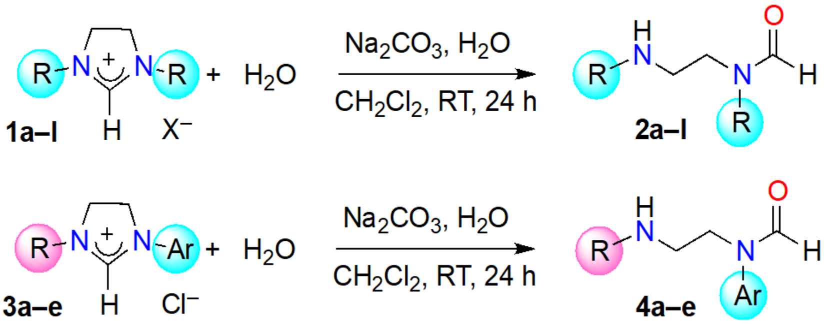
The stability of NHC-metal complexes has been widely studied over the years [1]. However, very few studies aimed at investigating deliberately the hydrolysis of NHCs or their azolium salt precursors. Herein, we report a detailed investigation of the hydrolytic cleavage of symmetrical and unsymmetrical imidazolinium salts into the corresponding γ-amino formamides under mild, aerobic conditions and the influence of various structural parameters on the stability these NHC precursors in the presence of water (Scheme 1) [2].



Scheme1. Hydrolysis of sym. and unsym.imidazolinium salts under basic aqueous conditions.

Key words: Hydrolysis, γ-amino formamides, symmetrical imidazolinium salts, unsymmetrical imidazolinium salts, Aqueous conditions.

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Antioxidant Activity of PLA Films Prepared with Izmir Oregano Essential Oil and Antibacterial Effects of This Essential Oil

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Known to be used in folk medicine since ancient times, Izmir oregano (*Origanum onites*) is among the plants that have the potential to be a raw material for medicine, thanks to the important components they contain. Integrating Poly Lactic Acid (PLA), which is a natural biodegradable carrier that allows the controlled release of active ingredients, and herbal essential oils can enable the safe use of these plants. Applications for biopolymers, especially PLA, have increased in recent years. Due to its biodegradability, PLA is very suitable for the preparation of disposable medical devices. Because of this feature, PLA is an important biodegradable material that can be used in drug production. By adding essential oils to PLA matrix, different biological effects such as antibacterial, antifungal, and antioxidant can be added to PLA. In this study, PLA polymer films were produced by adding essential oils obtained by water vapor distillation method from aerial parts of Izmir oregano at different rates (0, 5, 10, and 20 % of PLA). PLA films were prepared by the solution pouring method. While the antibacterial effects of essential oils on Gram-negative (*Escherichia col*i ATCC 25922, *Pseudomonas aeruginosa* PA01), Gram-positive (*Enterococcus faecalis* ATCC 29212, *Staphylococcus aureus* ATCC 25923) bacterial strains were investigated by the “Agar Well Diffusion” method, it was also determined that PLA films containing essential oil compounds had reducing power and DPPH radical scavenging activity. Its antioxidant properties were also investigated. It has been determined that Izmir oregano essential oil has strong antibacterial effects on all four bacterial strains studied.

Keywords: Antioxidant activity, antibacterial activity, PLA film, Izmir oregano

This study was supported by the Scientific Research Projects Coordination Unit of the Çanakkale Onsekiz Mart University. Project Number: FBA-2022-4165

Effects of ultrasound technology parameters on phenolics and oxidative stability in *Chemlali* and *Memecik cv*. olive oil.

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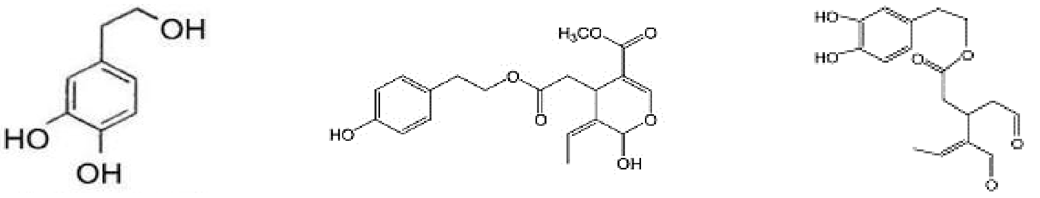
In this work, the occurrence of secoiridoid aglycones via degradation of phenolic glucosides which have strong effects on commercial and nutritional properties of olive oil. The experiment consists in the sonication treatment of *Chemlali* and *Memecik cv*. olive oil with different times (0,4, 8, 10 min). This kind of approach has never been used in determining the partition and degradation of phenolics during extraction. Concerning phenolic content present in *Chemlali* olive oil extracted from whole olives, no significant differences are found after 10 min of treatment using ultrasound apparatus. On the other hand, the total phenolic content of *Memecik* cv. increases 15 positively with the increasing time of treatment. The quality parameters and oxidative stability have been also studied. Therefore, the olive oil yield increase with increasing time of ultrasound treatment. The application of ultrasound did not adversely affect the quality characteristics, as well as the antioxidant activity. Furthermore, the oxidative stability data, we can conclude that ultrasound treatment can affect the olive oil oxidative stability. This study could provide useful information for industry to produce olive oil with high yield and quality.



Hydroxytyrosol   Aldehydic ligstroside aglycone   Aldehydic oleuropein aglycone

Fig. Major phenolic compounds identified in olive oil with regard to ultrasound pretreatment

Key words: olive oil, phenolic compounds, ultrasound treatment, antioxidant activities.

Radiation-Induced Grafting of Styrene onto Polyvinylfluoride substrate. Preparation and kinetic Investigation

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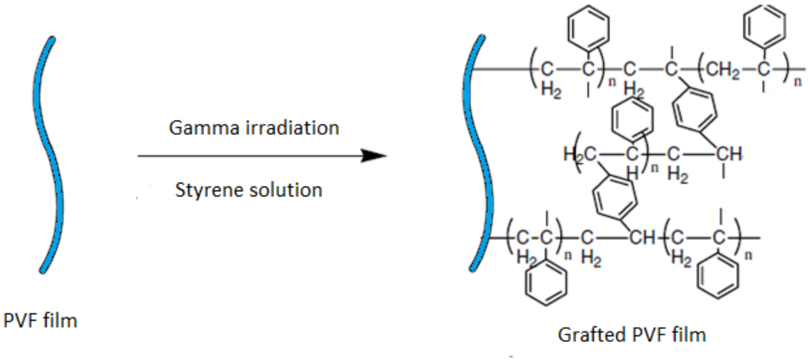
In this work, gamma irradiation from a cobalt ^{60}Co source was used to graft copolymerize styrene onto polyvinylfluoride (PVF) films which can be used after sulfonation as polymer electrolyte membrane for fuel cell application. Grafting reaction was performed at ambient temperature under nitrogen by simultaneous method applying different dose rates of 1.32 ± 5.24 kGy/h for a total absorbed dose of 20 kGy. To achieve desired degree of grafting (DOG), a number of parameters including irradiation dose, type of solvent, monomer concentration and dose rate were investigated. The films were characterized before and after grafting by means of Fourier Transform Infrared (FTIR), Scanning Electron microscopy (SEM), Differential Scanning Calorimetry (DSC) and Thermogravimetry (TG). Obtained results showed that grafting parameters influenced significantly the grafting yield. Furthermore, the depth understanding of the graft copolymerization reaction kinetics under various reactions conditions allowed as the establishment of the dependence of the initial rate of grafting as a function as dose rate and monomer concentration and was expressed by the subsequent equation: $\frac{\mathrm{dG_0}}{\mathrm{dt}} = \alpha[M]^{2.14}[D]^{0.49}$

Keywords: Graft copolymerization, kinetic of grafting, simultaneous method, degree of grafting.



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