Second Colloque International sur les Matériaux, l'Electrochimie et l'Environnement, CIMEE'18

Program & Abstract Book

2nd INTERNATIONAL SYMPOSIUM

On

« Materials, Electrochemistry & Environment »

18 – 20 October 2018 | Tripoli, Lebanon

The Largest Gathering of Materials, Electrochemistry & Environment Experts

In Partenship with:

- Laboratory of Applied Chemistry & Environment, National School of Applied Sciences, ENSA, University of Ibn Zohr, Agadir, Morocco
- Technology Laboratory Separation & purification, Faculty of Sciences, University of Tlemcen, Algeria
- National School of Engineering of Sfax (ENIS), University of Sfax, Tunisia
- National Laboratory of chemistry & Environmental chemistry, LCEE, Chemistry Department, Faculty of Science, University of Batna, Algeria.

Description

This Book composes the abstracts of the presentations for the platform and poster sessions of the Second International Symposium (CIMEE), conducted from 18–20 October 2018 at the CCIAT, Tripoli, Lebanon. The abstracts are reproduced as accepted by the scientific committee of the Symposium and appear in order of abstract code in the Symposium program.

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Program & Abstract Book

Table of Comtents

	Page
• Welcome Letters	5
• Scope & Topics	9
• Committees	10
• Preliminary Symposium Program	13
• Keynote Lectures	19
• Plenary Lectures	23
• Oral Communications: Physico - Chemical analysis and Environment	32
• Poster Communications: Physico -Chemical analysis and Environment	45
• Oral Communications : Electrochemistry & new materials	50
• Poster Communications : Electrochemistry & new materials	54
• Oral Communications : Materials/nanomaterials for the environment	57
• Poster Communications : Materialsnanomaterials for the environment	62
• Oral Communications : GeoEnvironment and Materials	67
• Oral Communications : Advanced techniques for surface & Materials characterization	69
• Poster Communications : Advanced techniques for surface & Materials characterization	73
• Oral Communications : Electrochemical & Environmental Materials	77
• Poster Communications : Electrochemical & Environmental Materials	81
• Oral Communications : Electrochemical processing of Materials	83
• Poster Communications : Electrochemical processing of Materials	85
• Oral Communication : Biomaterials in Sustainable Agriculture and environment (agrochemicals, agro-materials)	89
• Oral Communications : Valorization of Biomass, Bioremediation, phytoremediation	92
• Oral Communications : Environmental geochemistry/Hydrogeochemistry, AgroEnvironment	95
• Posterl Communications : Environmental geochemistry/Hydrogeochemistry, AgroEnvironment	99
• Oral Communications : Bio/Electrochemistry & Environmental applications	103

Second International Symposium on Materials, Electrochemistry & Environment
FPH, DSST, Lebanese University, Tripoli, Lebanon
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Printed in Lebanon

Welcome Letter from Symposium President

Dear distinguished scholars, academics, students, guests, friends, partners and delegates from all universities and organizations both in Lebanon and around the world.

On behalf of the Organizing Committee, I am most pleased to extend to you a warm invitation to attend the 2th International Symposium On Materials, Electrochemistry and Environment. Conference that will take place in Lebanon, from October 18 -20, 2018.

CIMEE is now a regular biennial event mainly organized in Mediterranean countries. Very successful recent editions have been held in Lebanon in 2016. Our main goals of CIMEE are to improve quality in the Mediterranean Environment and Ecology by integrating, coordinating and adding national and scientific societies efforts.

During the three days of the Symposium, Lecturer, senior researchers and young scientists and PhD students will have the opportunity to engage in scientifically exciting discussions with experts in the field in an informal setting. Technical sessions will consist of oral presentations and Posters, supplemented by full manuscripts in PDF format on the symposium proceedings.

The theme of the CIMEE18 Symposium is "Innovative Materials and Novel Electrochemistry process for Sustainable Environment"; it will cover a broad disciplines of physical chemistry and environmental sciences such as: Materials for Environmental Remediation, Electrochemical Remediation of the Environment, Environmental Analytical Chemistry, AgroChemistry AgroEnvironment, GeoEnvironment / Geomaterials.

The Organizing Committee and the Board of CIMEE have created a vibrant platform, which will bring together colleagues from every area of Materials, Electrochemistry and Environmrntal chemistry research, prevention and Remediation. I sincerely hope that this Symposium will deliberate and discuss all the different facets of this exciting topic and come up with recommendations that will lead to a better, healthier, merrier world. We're looking forward to an excellent meeting with great scientists from different countries around the world and sharing new and exciting results in Environmental Chemistry.

The coastal city offers an excellent venue for the conference, plenty of accommodations for stay, beautiful places to visit and a rich and long history. The organizing Committee consists of dedicated, experienced and hardworking researchers from all over the world.

Hope to see you and many new faces during CIMEE18.

El Moll Ahmad.

Faculty of public Health, Faculty of science, DSST, Lebanese University, Lebanon

Welcome Message from Symposium Co-Chair

Dear Colleagues,

We are all aware that climate change, droughts, population growth and the continuing view that water is an infinite resource are reasons for water shortages in many areas across Mediterranean. The forecast for the future looks gloomy and discouraging. Effective and efficient solutions require the understanding of local needs and particularities and the wise use of local advantages towards sustainability. In this context, the 2nd International Symposium on Materials, Electrochemistry and Environment (CIMEE 2018), organized by major Mediterranean universities and research institutions, aims to provide a wonderful forum for knowledge diffusion and innovations exploration in the emerging field of the environmental electrochemistry.

As the Co-Chair of CIMEE 2018, I am honored and pleased to invite all of the great scientists, academicians, young researchers, business delegates and students from all over the world to attend this major event, to be held October 18 - 20, 2018 in Tripoli, Lebanon.

CIMEE 2018 Conference will strive to offer plenty of networking opportunities, providing you with the opportunity to meet and interact with the leading scientists and researchers, friends and colleagues.

I hope you will join us for a symphony of outstanding science, and take a little extra time to enjoy the spectacular and unique beauty of this region of Lebanon.

I am looking forward to meet all and make CIMEE 2018 a grand success.

Konstantinos V. Plakas

Centre for Research and Technology-Hellas, CERTH, CPERI, Greece

Welcome Message from the Organizing Committee Chair

Dear colleagues and friends,

On behalf of the Organizing Committee, we would like to welcome you to the beautiful coastal city of the Mediterranean for the 2th edition of the International Symposium On Materials, electrochemistry and Environment (CIMEE 2018), which continues the long tradition of the previous Symposia on Chemistry and the Environment. As a unique trait, the CIMEE Symposium focuses on the recent advances in electrochemical process, Environmental Materials, environmental analytical chemistry and on all their new environmental applications. The coastal city offers an excellent venue for the conference, plenty of accommodations for stay, beautiful places to visit and a rich and long history. The organizing Committee consists of dedicated, experienced and hardworking researchers from all over the world.

During the three days of the Symposium, Lecturer, senior researchers and young scientists and PhD students will have the opportunity to engage in scientifically exciting discussions with experts in the field in an informal setting. Technical sessions will consist of oral presentations and Posters, supplemented by full manuscripts in PDF format on the symposium proceedings.

The CIMEE 2018 Organizing Committee wishes you a very successful Symposium. Enjoy your visit and your stay, and let's make this an enjoyable and rewarding event.

We cordially invite you to the symposium and please feel free to bring your colleagues and students to the event. We are looking forward to meeting you at the symposium.

The Organizing committee looks forward to meeting you in Lebanon.

El Moll Hani

Faculty of sciences, Department of Chemistry, University of Hail, KSA

Welcome Message from the Scientific Committee Chair

Dear Colleagues,

As an invited speakers and chair of scientific committee of the second International Symposium, it is my pleasure to extend greetings to the all participants and researchers.

Second International Symposium on Materials, Electrochemistry & Environment is a multidisciplinary symposium for communicating major themes relevant to Materials, Electrochemistry and analytical chemistry area through plenary and keynote lectures, invited talks, and general speakers

The theme of the CIMEE18 is "environmental pollution : the role of Materials, electrochemistry and analytical chemistry" emphasizing the role of materials and electrochemistry in fundamental research up to the development and deployment of novel processes and solutions

The Scientific Committee will work hard to present a challenging scientific program in the form of plenary lectures, scientific sessions, round-table discussions and a poster session

CIMEE18. This biannual event provides an opportunity for scientific leaders to unite the International researcher of Chemistry, discuss issues of concern facing the scientific community. As you gather to reflect on your discuss new ideas, we appreciate your continued leadership and contributions that help the quality of the environment

On behalf of the chair of scientific committee, you have my best wishes for an enjoyable and productive event.

Soylak Mustafa

Faculty of Sciences, Department of Chemistry, Kayseri, Turkey

Scope & Topics

Since the first edition in 2016, this symposium has been held biannually in Middle East and displays an ever-increasing international profile. Delegates from all over the world are attending the meeting and the official language is English. The relaxed atmosphere and the pleasant venue of the meeting favor the exchange of information and ideas for potential research collaborations.

The scientific program will focus on the latest research into the Electrochemistry, Materials and environmental analytical chemistry. We will take a holistic view of investigations at various scales, blending research into basic processes with study of routes of environmental exposure and the development of practical management strategies to reduce contamination.

The program will be of interest to environmental scientists from research organizations, industry, government and NGO's and to those in related disciplines seeking a concise overview of the state-of-the art.

The SCOPE of the symposium includes:

- Electrochemistry & new materials
- Geomaterials for the environment
- GeoEnvironment & Materials
- Advanced techniques for surface & Materials characterization
- Electrochemical & Environmental Materials
- Electrochemical processing of Materials and biomaterials
- AgroChemicals, Agro-materials, pesticides & sustainable agriculture
- Electrochemical sensors & biosensors for environmental monitoring
- Environmental applications of analytical biosensors
- Physico -Chemical analysis and Environment
- Physical & Analytical Electrochemistry, environmental monitoring
- Valorization of Biomass, Bioremediation, phytoremediation
- Environmental geochemistry/Hydrogeochemistry, AgroEnvironment
- Bio/Electrochemistry & Environmental applications.

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Preliminary Symposium Program Thursday 18 October 2018	
(Morning session)	
08h30 – 09h00	Arrival/registration / poster installation
09h00 – 10h00	Official Opening Ceremony
10h00 – 10h45	Opening Keynote, KL1: Environmental applications of advanced electrochemical treatment processes: the case of hydraulic fracturing wastewater **Konstantinos V. Plakas** Centre for Research and Technology – Hellas (CERTH), Thessaloniki, Greece
10h45 – 11h30	Opening Keynote, KL2 : Phytobac and Nanotechnology-based process (electrocoagulation) for pesticide wastewater treatment prior to reuse in agricultural irrigation **Rachid Salghi** Deputy Director of Research & Cooperation at ENSA, University of Ibn Zohr, Agadir, Morocco
11h30 – 12h15	Opening Keynote, KL3: Nanotechnology and environmental applications : Future trends **Shivendu Ranjan** Head, Research and Technology Development, E-Spin Nanotech, SIIC Extension, IIT, Kanpur, India
12h15 – 13h30	Lunch break
(Afternoon session)	
ORAL SESSION 2: Materials for the environment (Topic 2) Chairs: Konstantinos V. Plakas, Ahmad ElMoll	
13h30– 14h00	Plenary Lecture, PL1: Production of a new materials from Moroccan oil shale **Abdelkrim ABOURRICHE** National Schools of Applied Sciences of Safi, University of Cadi Ayyad, Marrakech, Morocco.
14h00– 14h30	Plenary Lecture, PL2 : Optimization of Oxytetraccline sorption on to iron modified montmorillonite **Mahmood M. Barbooti,** Department of Applied Science**,** University of Technolog, Baghdad, Iraq**.**
14h30 – 14h45	OC1 : The use of Magnetic Multiwalled Carbon Nanotubes Functionalized with Chitosan for Nitrate Removal from Wastewater **Pr. Shehdeh Jodeh,** Department of Chemistry**,** An-Najah National University **,** Palestine
14h45 – 15h00	OC2 : Valorisation of natural resources, polymerization of b-pinenecatalysed by a Montmorillonite clay **Dr. Amine Harrane,** Université de Mostaganem, Faculté FSEI, Département de Chimie, Mostaganem, Algérie
15h00 – 15h15	OC3 : Adsorption of Methylene Blue from Aqueous Solutions by Vanadium-substituted Polyoxo molybdates **Dr. Roula Abi Saad** Department of Chemistry, Faculty of Science, Beirut Arab University, Beirut, Lebanon Lebanese Agricultural Research Institute , LARI, Fanar, Lebanon
15h15 – 15h30	OC3 : Effet de la chaux éteinte sur le ciment Geopolymère à base de la pouzzolane Marocaine du moyen Atlas **Aziz Ayoub** Institut Scientifique de Rabat, Av. Ibn Batouta, Rabat-Agdal Maroc
15h30 – 15h45	***Coffee break and Poster session***
ORAL SESSION 3: Physico-chimical analysis and environment (Topic 10) Chairs: Djamila Halliche, Tawfik El Naboulsi,	
15h45– 16h00	OC4 : Monitoring of organic pollutants in atmosphere: Recent innovations. **ElMoll Ahmad** Faculty of Public Health, Faculty of Sciences, DSST, Lebanese University, Tripoli, Lebanon
16h00 – 16h15	OC5 : Develop water depollution processes to remove medicinal residues such as Metronidazole and sodium salicylate **Nouh Aarab** Materials and Environment Laboratory, Faculty of Sciences, Ibn Zohr University, Agadir, Morocco.
16h15 – 16h30	OC6 : The kinetic, Isotherm and Thermodynamics study of Cationic dye adsorption in presence of Sawdust Modified **Laktif Toufa** Laboratory of Materials and Environment, LME, Faculty of sciences,Ibn Zohr University, Agadir, Morocco
16h30 – 16h45	OC7 : Adsorption of Cationic Dyes (Rhodamine B and Cristal violet) From Water Using Polyaniline (EB): Investigation of Kinetics and Isothermal Modeling **Hsini Abdelghani** Laboratory of Materials and Environment, LME, Department of Chemistry, Faculty of sciences, Ibn Zohr University, Agadir, Morocco
16h45 – 17h30	***Coffee break and Poster session***

Friday 19 October 2018	
(Morning session)	
ORAL SESSION 4: Physico-chimical analysis and environment (Topic 10) Chairs: Rachid Salghi, Monzer Awwad	
08h00 – 08h30	Registration
08h30 – 09h00	Invited speaker, PL3 : Separation and preconcentration methods in trace species in environmental samples: from solid phase extraction to microextraction **Mustafa Soylak,** Erciyes University, Faculty of Sciences, Department of Chemistry, 38039, Kayseri,Turkey
09h00 – 09h30	Plenary Lecture, PL4 : Pollutants in our irrigation waters: sources, risks and ways for mitigation **Olfa Mahjoub** Head of the Chemistry Laboratory for Water-Soil-Biosolids, National Research Institute for Rural Engineering, Water, and Forestry (INRGREF), Ariana, Tunisia
09h30– 09h45	OC8 : Physico-chimical analysis and environmental investigation of thermal springs in Tunisia **Badia Chulli** Centre de recherches et des Technologies des eaux , Borj-Cedria Technopark, Soliman , Tunisia.
09h45 – 10h00	OC9 : Polyoxometalates Towards Water Hardness Treatment and Anti-bacterial Activity **Rami Oweini** Department of Chemistry, Faculty of Science, Beirut Arab University, Beirut, Lebanon
10h00 – 10h15	OC10 : Removal of nickel from aqueous solution and industrial effluent by iron oxide **Bakari Zeinab** Department of chemistry, University of Florence, Italy Laboratory of Environmental Engineering and EcoTechnology. University of Sfax, Tunisia
10h15 – 10h30	OC11 : Existing land use and extent of Lead (Pb) contamination in the grazing food chain of the closed carmona sanitary landfill **Richard Dein D. Altarez** Department of Natural Sciences, Headquarters Academic Group, Philippine Military Academy, Fort General Gregorio H del Pilar, Baguio City, Philippines
10h30 – 10h45	OC12 : Effect of the synthesis method, complexing agent and solvent on the physicochemical properties of $LaNiO_3$ Nanopowders **Djani Faiçal** Laboratoire de Chimie Moléculaire et Environnement, Université de Biskra, Algérie
10h45 – 11h00	OC13 : Photodegradation of methylene blue catalyzed by heteropolytungstates/SiO2 hybrid materials under Ultra-Violet irradiation **Fatima Yahya** Department of Chemistry, Faculty of Science, Beirut Arab University, Lebanon
11h00 – 11h15	OC14 : A Comparative chemical composition of Green seaweed Ulva Lactuca and green Plant Spinacia oleracea **Douaa Salim** Laboratory of applied biotechnology, Azm Center for Research in Biotechnology and its Applications , DSST, Lebanese University, Tripoli, Lebanon
11h15 – 11h30	***Coffee break & Poster session***
11h30 – 13h00	***Lunch Break***
(Afternoon session)	
ORAL SESSION 5: Electrochemistry & Environmental applications (Topic 14) Chairs: Djamila Halliche, Ahmad ElMoll	
13h00 – 13h30	Plenary Lecture, PL5 : Electro-Fenton regeneration of carbon monolith adsorbents used as cathode materials **Didier Hauchard** Professor at the ENSCR, Institut Sciences Chimiques de Rennes, Rennes, France.
14h00 – 14h30	Plenary Lecture, PL6 : Extractions without Organic Solvents: Advantages and Disadvantages **Aleksandra Cvetanović,** Department of Biotechnology and Pharmaceutical Engineering, Faculty of Technology, University of Novi Sad, Serbia
14h30 – 14h45	OC14 : Electrochemical treatment of phenol in brine water using aplate-and-frame GDE/BDD reactor - A pilot plant study **Bassam Tawabini** College of Petroleum Eng. & Geosciences, King Fahd University of Petroleum and Minerals, KFUPM , Saudi Arabia
14h45 – 15h00	OC15 : Removal of Selected Pharmaceuticals from Aqueous Solutions Using Heterogeneous Photocatalysis **Samer Khalaf** Department of Science, University of Basilicata, 85100, Potenza, Italy. Department of Earth and Environmental Sciences, Al-Quds University, Jerusalem, Palestine

15h00 – 15h15	OC16 : Phytobac and electrocoagulation: two practical management tools for pesticides wastewaters **Rachid Salghi** Laboratory of Applied Chemistry and Environment, ENSA, National School of Applied Science, Ibn Zohr University, PO Box 1136, 80000 Agadir, Morocco
15h15– 15h30	OC17 : Le traitement des eaux usées urbain par la technique de l'électrocoagulation-floculation **Khadija Haboubi** Ecole Nationale des Sciences Appliquées, Al Hoceima Université Mohammed Premier, Oujda, Maroc
15h30 – 15h45	***Coffee break & Poster session***
ORAL SESSION 6: Electrochemistry and new environment (Topic 1) Chairs: Mustafa Soylak, Monzer Awwad	
15h45 – 16h00	OC18 : Development of multi-modal and multi-level molecular systems. **Youssef Aidibi** Laboratoire MOLTECH Anjou, UMR 6200, Université d'Angers Angers, France
16h00 – 16h15	OC19 : New Chalcone Derivatives as Corrosion Inhibitors of Mild Steel in Acid Medium: Insights from Experimental and Computational Studies **Chaouiki Abdel Karim** Laboratory separation processes, Faculty of Science, University IbnTofail, Kenitra, Morocco
ORAL SESSION 7: Physical & Analytical Electrochemistry, environmental monitoring (Topic 2) Chairs : Konstantinos V. Plakas, Didier Hauchard	
16h45 – 17h00	OC20 : Development of electrochemical micro-sensors for the detection of organic pesticides residues, **Noura Chlak** Université de Rennes, École Nationale de Chimie de Rennes ENSCR, CNRS, ISCR-UMR6226, Rennes, France.
17h15 – 17h30	OC21 : Polyoxometalates as Photocatalysts for Atrazine Degradation. **Lobna Youssef** Department of Chemistry, Faculty of Science, Beirut Arab University, Lebanon
17h30 – 17h45	OC21 : Adsorption des pesticides organochlorés sur un charbon actif préparé à partir de noyaux de dattes **Rayan Sahmarany** Laboratoire des Sciences de l'Eau et de l'Environnement (L.S.E.E), Université Libanaise, Liban
17h45 – 18h00	OC22 : Characterization and Seasonal Variation of Tripoli Landfill Leachate in north of Lebanon **Ahmad Moustafa** Biotechnology Laboratory, ER 032 (LBA 3B), Lebanese University, DSST, Tripoli, Lebanon
18h00 – 18h15	***Coffee break and Poster session***

Saturday 20 October 2018	
(Morning session)	
ORAL SESSION 8: Advanced techniques for surface & Materials characterization (Topic 4) Chairs: Mustafa Soylak, Issam Naboulsi	
08h00 – 08h30	Registration / poster installation
08h30 – 09h00	Pleneray Lecture, PL7 : Friedel–Crafts reaction on calcined hydrotalcites materials **Djamila Halliche** Laboratoire de Chimie du Gaz naturel, Faculte´de Chimie, USTHB, Algiers, Algeria.
09h00 – 09h15	OC23 : Environmental Protection and Remediation : the applications of Materials and Electrochemistry **ElMoll Ahmad** Faculty of Public Health, Faculty of Sciences, DSST, Lebanese University, Tripoli, Lebanon
09h15 – 09h30	OC24 : Surfaces displaying quasi-instantaneous bacterial inactivation under low intensity indoor light **Sami Rtimi** Swiss Federal Institute of Technology, EPFL, Advanced Oxidation Processes Group , Lausanne, Switzerland
09h30 – 09h45	OC25 : Catalytic oxidation of isopropyl alcohol over $Pt/Al_6Si_2O_{13}$: A study of the effect of methyl cellulose on Pt particles dispersion over mullite **Reine Ghaleb** Reactor's laboratory, Faculty of Engineering II, Lebanese University, Roumieh, Lebanon
09h45 – 10h00	OC26 : Mg_3/Al- Layered Double Hydroxide as Heterogeneous Basic catalysts for Kneovenagel Condensation **Mustapha Dib** Laboratory of Organic and Analytical Chemistry**,** Faculty of Sciences and Technologies**,** Sultan MoulaySlimane University, Morocco
10h15 – 10h30	***Coffee break and Poster session***.

ORAL SESSION 9: Electrochemical processing of Materials and biomaterials (Topic 6) Chairs: Issam Naboulsi, Ahmad ElMoll	
10h30 – 10h45	OC27 : Comparative study of corrosion inhibition of Artemisia herbaalbaleaves aqueous extract on the corrosion of mild steel and aluminum in 1M HCl. **Asmae Berrissoul** Laboratory of analytical and applied chemistry,materials and environment, Université Mohammed Premier, Oujda, Morocco
10h45 – 11h00	OC28 : Solvothermal synthesis, characterization photocatalytic properties and antimony Sulfide Sb_2S_3 **Rachid Makhloufi** Laboratoire Chimie appliquée, Département sciences de la Matières, Université de Biskra, Algérie
11h00 – 12h15	***Lunch Break and poster session***
(Afternoon session)	
ORAL SESSION 10: Environmental geochemistry/ AgroEnvironment GeoEnvironment (Topic 13) Chairs: Tawfik AlNabousi, Djamila Halliche	
13h00 – 13h30	Pleneray Lecture, PL8: Environmental geochemistry, Agro ressources devolopement in SASS Aquifer shared between Tunisia, Algeria and Lybia **Badia Chulli** Centre de recherches et des Technologies des eaux, Borj-Cedria Technopark, Soliman , Tunisia.
13h30 – 13h45	OC29 : Evaluation of endocrine disrupting chemicals bioremediation and production of biomolecules by living cyanobacteria under estradiol stress condition **Dalel Belhaj** University of Sfax, Department of Life Sciences, Laboratory of Biodiversity and Aquatic Ecosystems , Ecology and Planktonology, Tunisia..
13h45 – 14h00	OC30 : Anti-adipogenic and lipolytic effect of Micromeria Barbata ethanolic extract on 3T3-L1 adipocytes **Bariaaa Nafeh** Applied Biotechnology and Cell Culture Laboratory, Doctoral School for Sciences and Technology, Lebanese University, Tripoli, Lebanon.
14h00 – 14h15	OC31 : Durcissement structural des alliages Pb Cd Mg et Pb Cd Mg Ag pour les grilles de batteries **Latifa Zerrouk** Laboratoire Physico Chimie des procédés et matériaux, Faculté des Sciences et Techniques de Settat , Université Hassan I, Settat, Maroco
14h15 – 14h30	OC32 : Metabolic engineering of Escherichia coli for production of Hyaluronic acid **Amin Khadija** Laboratory of applied biotechnology, Azm Center for Research in Biotechnology and its Applications, DSST, Lebanese University, Tripoli, Lebanon
14h30 – 14h45	OC33 : Investigation and Characterization of Algal Biomass Leathesia difformis and its Polysaccharide Fucidan to discover its Biological Properties. **Reem El Monla** Laboratory of applied biotechnology, Azm Center for Research in Biotechnology and its Applications, DSST, Lebanese University, Tripoli, Lebanon
14h45 – 15h00	***Coffee break poster session***
SPECIAL SESSION 11: 'How to publish in high impact journals' sponsored by Springer Chairs: Konstantinos Plakas, Ahmad ElMoll Springer	
15h00 – 15h15	Publier dans une revue scientifique ou un ouvrage scientifique
15h15 – 15h30	Production Scientifique : la tendance au Liban ? CNRS-L
15h30 – 15h45	Recherche de financement de projet international de recherche
15h45 – 16h00	préparer une proposition d'ouvrage, Maison d'édition
16h00 – 16h15	***Coffee break***
16h15 – 17h00	Séance de clôture. Recommandation

POSTER SESSION

Session 1 : Materials for the environment

Optimization of the parameters of obtaining chitosan and its applications in the treatment of wash water from the TAKSEBT potabilization station
Kadouche Slimane
Université Mouloud MAMMERI de Tizi Ouzou, Algérie

Numerical Simulation of Armed Earth
Fouzia Chaht
The National Polytechnic School of Oran, Department of Civil Engineering, Oran, Algeria.

Efficiency of magnetic chitosan supported on graphene for removal of perchlorate ions from wastewater
Ghadir Hanbali
Department of Chemistry, An-Najah National University , Nablus, Palestine

Graphene- $CoFe_2O_4$ Magnetic Nanohybrids for Efficient Removal of Cyanide from Wastewater
Bayan Khalaf
Department of Chemistry, An-Najah National University , Palestine

Session 2: Electrochemical & Environmental Materials

A Theoritical and experimental study of the inhibition of the corrosion of Steel carbone in HCl by using of new molecule dirived by quinoline
Hicham Fakhry
Laboratoire de procédé de séparation , Faculté des Sciences, Université Ibn Tofail , Kénitra, Maroc,

Session 3-4: Electrochemical processing of Materials and biomaterials

Synergistic Effect of an Hydrazone compound and potassium iodide on inhibition of corrosion of carbone steel in 1M HCl
Amel Fellah
Laboratory of Analytical Chemistry and Electrochemistry, Department of Chemistry, Faculty of sciences, University AbouBakrBelkaïd ,Tlemcen, Algeria ,

Imidazolium grafting surface to perform oxygen reduction in lithium-air battery
Walaa Nasser Al Dine
Chimie Moléculaire et Organisation du Solide" (CMOS), Département "Chimie Moléculaire et Macromoléculaire" Institut Charles Gerhardt de Montpellier (ICGM).

Highly sensitive and selective sensor for determination of profenofos based on MIP/GO/modified glassy carbon electrode
Ahmed Bahgat Khalil Abdelaziz Abdallah
Chemistry Department, Faculty of Science, Mansoura University, Mansoura, Egypt

Session 5 : Advanced techniques for surface & Materials characterization

Investigation of corrosion inhibition effect of vitamin B1 on copper in 1M HNO3 solution: electrochemical study and surface analysis
Amel Sedik
Centre de recherche scientifique et technique, en Analyse Physico-Chimique, CRAPC, Bou Ismail Tipaza, Algérie.

Caractérisation d'un réfractaire à base de kaolin DD1 de l'est de l'Algérie
Ladjama Sabrina
Unité de recherche en Matériaux Avancés, URMA, Annaba, Centre de Recherche en Technologies Industrielles, CRTI Cheraga, Alger, Algérie

Structural study and the effect of ionic size of the systems (Gd1-x LuX) $_3Al_5O_{12}$ doped Erbium
Lanez Imane
LASICOM Laboratory, Faculty of sciences, Saad Dahleb Blida University.

The effect of Europium in structural and optical study of the systems (Gd1-x LuX) $_3Al_5O_{12}$. Oral presentation OK by Hacali
Rekik Brahim
LASICOM Laboratory, Faculty of sciences, Saad Dahleb Blida University. Blida, Algeria

Session 6 : Agro-materials, pesticides & sustainable agriculture AgroChemicals

Comparative study of the insecticidal activity of the Pigment extracts of High Green Plants (Spinaceaolearecea) and Chlorophytaealgae (Ulva Lactuca) against fruit fly Drosophila melanogaster
M. Rima
Laboratory of applied biotechnology , Azm Center for Research in Biotechnology and its Applications ,
DSST, Lebanese University ,Tripoli, Lebanon

Short- and Medium Term Impact of Conservation Agriculture on Organic Matter and Humic Acids of Soil
Lghrour Malika
Physical chemistry laboratory of materials and nanomaterials: Pollution control, environment and sustainable development, Mohammed V University, FS. Rabat, Rabat, Morocco

Session 7 : Environmental geochemistry/Hydrogeochemistry, AgroEnvironment.

Quantitative study of Ground Area of ElHdaeik Wilaya Skikda (N-E Algeria)
Nassima Sedrati
University of Badji Mokhtar, Annaba and Research and Sustainable Development Laboratory, Algeria

L'enrichissement en nutriment et risque d"eutrophisation des eaux de l'Oued Kebir (Skikda, Algérie)
Samia Benrabah
Laboratoire de Géologie , Université Badji Mokhtar , Faculté des sciences de la terre, Algérie

Session 8 : Physico -Chemical analysis and Environment

Comparative study of municipal solid waste treatment technologies in the city of Tripoli
Mayas Al Masri
Department of physics, Faculty of sciences, Lebanese University, Tripoli, Lebanon

Adsorption of Cationic Dyes (Rhodamine B and Cristal violet) From Water Using Polyaniline (EB): Investigation of Kinetics and Isothermal Modeling
Hsini Abdelghani
Laboratory of Materials and Environment, LME, Department of Chemistry, Faculty of sciences, Ibn Zohr University, Agadir, Morocco

Transfer of pollutants in the soil towards groundwater of the Kharraza plain N-E Algerian
Attoui Badra
Laboratoire de Géologie, Université Annaba, Algérie.

The kinetic, Isotherm and Thermodynamics study of Cationic dye adsorption in presence of Sawdust Modified
Laktif Toufa
Laboratory of Materials and Environment, LME, Department of Chemistry, Faculty of sciences, Ibn Zohr University, Agadir, Morocco

Etude de la pollution atmosphérique issue du secteur du transport routier
Kechiche Najah
Higher Institute of Transport and Logistics, University of Sousse, Sousse, Tunisia

Keynote Lectures

Environmental applications of advanced electrochemical treatment processes: the case of hydraulic fracturing wastewater

Konstantinos V. Plakas*

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Abstract

Water is an essential component in shale oil and gas production, and effectively managing its use from source to disposal can be critical not only in terms of controlling costs but also for addressing other operational issues and considerations. While progress has been made on the water quantity and quality impacts of shale oil and gas development, challenges remain, including the potential cumulative long-term water impacts of the industry. Additional water research and environmental policy changes will be necessary in order to fully realize the economic opportunity of the world's oil and natural gas wealth while safeguarding the environment. In this context, significant research efforts have been concentrated on the development of novel technologies that can treat and reuse themassive volumes of wastewater produced during the shale oil and gas extraction processes (hydrulic fracturing) in an efficient, cost effective and environmental friendly manner.Electro-based treatment, which uses electrons to treat wastewater, without the need for chemicals or biomass, has been recently considered in literature as a highly efficient 'clean technology' for this scope [1]. This paper reviews the development, design and applications of electro-assisted treatment technologies in hydraulic fracturing wastewater treatment along with their perspectives in the oil and gas industry market. These processes can be divided into three categories: a) advanced electro-driven separation processes (e.g. electrocoagulation, electrodialysis reversal, capacitive deionization), b) electrochemical advanced oxidation processes (e.g. electro-Fenton), and c) hybrid electro-driven technologies (e.g. microbial capacitive deionization, electro-oxidation coupled with precipitation). Each category serves a different treatment scope (desalination, softening, mineralization, etc.) and can be implemented at shale oil and/or gas well sites or centralized treatment facilities to enable reuse of hydraulic fracturing wastewater for different purposes. The pros and cons of the electro-assisted technologies reviewed are discussed and the priorities of R&D on technical issues are identified.

Keywords: hydraulic fracturing, wastewater, management, reuse, electro-driven technologies

References

[1] S. Jiménez, M.M. Micó, M. Arnaldos, F. Medina, S. Contreras, S. Chemosphere **2018**, 192, 186-208.

Phytobac and Nanotechnology-based process (electrocoagulation) for pesticide wastewater treatment prior to reuse in agricultural irrigation

Rachid Salghi[1,*], Mohmed Errami[1], Mohamed Zougagh[2] , Abderrahim Hormatallah[3]

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Abstract

The farmers interest in the use of this innovation is responsive to the development of innovative combined system which will be presented to water sector decision markers of the Arab Ministerial Water Council to include in their national water strategies and also within the Arab Water Strategy 2010-2030. No work has been carried out to date using nanomaterials as an additive to remove pesticide for comparison to the conventional electrocoagulation system. The percentage of sludge less than 5%. The impacts of these system were sustain clean ground water, prevent land degradation and sustain human health through having safe food products when reusing agricultural. This work provides new results on the electrocoagulation and phytobac degradation of pesticide and lead to the following conclusion such as, after 90 days, the pesticide residue in the pytobac is lower at limit of detection (LD). For all pesticide studied by electrocoagulation the removal of pesticide wastewater is between 96% to 98%.

Keywords: Pesticide wastewaters; Phytobac; Electrocoagulation, Nanotechnology

Nanotechnology and Environmental applications : Future trends

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Abstract

Nanotechnology will modify the environment both in a positive and negative way. On the one hand, new nanomaterials are promising for reducing greenhouse gases, cleaning toxic wastes and building alternative energy sources. On the other hand, some toxic nanoparticles enter and disrupt ecosystems. Therefore, research should focus on the sustainable use of nanomaterials to avoid environmental contamination.
The implementation of nanotechnology in drinking water treatment is a very promising field for applied research. A major part of this effort focuses on reducing the building units dimensions in the existing inorganic adsorbents used for the purification of water versus heavy metal species. The development of engineered nanoparticles has the potential to provide improved uptake efficiencies and sustainability if issues related to cost, technical incorporation and environmental safety will be overcome. This plenary talk presents the environmental benefits of nanomaterials in agriculture, water purification and nanomedicine.

Keywords : nanomaterials, environmental, nanoparticles, water treatment

Plenary Lectures

Separation and preconcentration methods in trace species in environmental samples: from solid phase extraction to microextraction

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Abstract

The organic and inorganic trace species in our body are playing important roles. Their determinations in the environmental samples are critical due to this point. The sample preparation is one of the important steps prior to determination of inorganic and organic species at trace levels in environmental samples by instrumental techniques. Separation and enrichment step is one of the necessary sample preparation steps for this purpose, due to their lower levels than the detection limits of the detection system and the interferic effects of the matrix components of the samples [1-3]. Solvent extraction, coprecipitation, membrane filtration, electrodeposition and flotation are widely used separation-enrichment techniques for the traces analytes in high highly saline samples.

Nowadays solid phase extraction with new nanomaterials which has high adsorption capacity and chemically stable including carbon nanotubes, graphene, polymeric materials, nanocomposites, covalent organic frameworks and metal organic frameworks is also very popular for that purpose. These nanomaterials are syntheses and characterized in analytical chemistry labs. In the characterization FTIR, SEM, Raman, XAD and thermal techniques are used. These materials are generally filled a suitable glass column and adsorption-desorption process were performed on this column. Also, the magnetic solid phase extraction (MSPE) has been developed in recent years as a new sample preparation method. Instead of centrifugation and filtration the adsorbents in during solid phase experiments, the aqueous solution of magnetic particles that participate to analytes can be separated easily and quickly using the external magnetic field.

Microextraction with new generation solvents which are green solvents for our environments including deep eutectic solvents, ionic liquids and switchable solvents is also popular technique with different modifications for the separation and preconcentration of traces organic and inorganic species. Microextraction is considered as green because of the minimizing of consumption of harmful solvents. An important effort has been shifted to the development of liquid phase microextraction methods, mainly characterized for eliminating or minimizing the time consuming, tedious and multistage operations, consumption of potentially organic solvents, production of secondary laboratory waste, necessity of large and complex laboratory equipments, which commonly faced in conventional speciation and preconcentration methods. New generation of solvents of interest in green chemistry represent switchable solvents, deep eutectic solvents and ionic liquids. For example, ionic liquids have some good physical and chemical properties, such as negligible vapor pressure, non-flammability, good solubility for inorganic and organic compounds and good extractability for organic and inorganic species at trace levels in the environmental samples.

In the separation-preconcentration works, pH of the working media, amount of reagents, amout of adsorbents or type and volume of the extraction solvents, sample volume and matrix effects

are the critical parameters for the quantitative recoveries of the analyte species. The optimizations of these parameters are performed by using model aqueous solutions. After optimization of the all analytical parameters, the accuracy is checked by the addition-recovery test and analyzing certificated materials. Lastly the method is applied to determination of the analyte contents of the real samples.
In the presented work, the usage of solid phase extraction and microextraction techniques for the separation-preconcentration of organic and inorganic species at trace levels in real samples will be discussed. Some applications of these techniques for environmental samples including natural water and food samples will be given.

Keywords: SPE, microextraction, traces species, environmental samples

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Extractions without Organic Solvents: Advantages and Disadvantages

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Abstract

The process of extraction is well-known and widely used in numerous fields. Until recently, it has been performed in its basic level both in laboratory and industry. However, increased environmental concerns, development of environmental chemistry and wish to get safe products imposed new trends in extract production. The basic goals which have to be achieved are elimination of harmful solvents and increase of extraction yield. Different modern techniques can be used in order to accomplish these aims, but the special focus has been put on these one which rely on "green" solvents, such as subcritical water or supercritical carbon-dioxide. These techniques could be great alternative for the extraction of compounds of different polarity by setting operational parameters i.e. by varying solvent polarity. Obtained extracts do not contain residue of organic/toxic solvents and there is no need for their further purification. This makes such techniques economically acceptable from the industrial point of view. Yet, there is a question, which are the limitation of these techniques? Are they really so good?

Different plant materials were extracted by applying different extraction techniques: supercritical carbon dioxide, pressurized hot water extraction, destination, Soxhlet, ultrasonic-assisted and microwave-assisted extraction. Obtained extracts were compared in terms of their chemical composition and biological activities. Chemical composition was determined by GC-MS and UHPLC-DAD-ESI-MS/MS analyses. Valuation of biological activity was done by measuring their antioxidant, antimicrobial cytotoxic and enzyme-inhibitory potential [1].

Environmentally-friendly techniques proven as excellent choice in terms of its solvating properties and selectivity. Almost in all cases, these techniques provided extracts richer in bioactive components. Obtained extracts are safe and could be applied directly in myriad of functional preparations.

Bearing in mind a priori knowledge, present requirements, potential risks and principals of green chemistry, enhanced extraction techniques represent high-potential techniques benign for environmental. Nevertheless, development of such techniques faces with different challenges. Contemporary analytical approach and validation of selected methods are needed for new solutions in order to protect human.

Keywords: Environmentally-friendly extractions, green solvents, contemporary analytical approach.

References

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Environmental Protection and Remediation : the applications of Materials and Electrochemistry

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Abstract

Contamination of the environment is one of the major problems facing the world today. At present, the various compartments of the environment are more and more contaminated by polluting multitudes. At the same time, rapid developments in the materials sector and electrochemistry have generated a great deal of interest in applications of the potential of nanomaterials in improved monitoring and cleaning systems, including the three phases of the environment.

Environmental remediation is based mainly on various technologies such as adsorption, absorption, chemical reactions, photocatalysis and filtration to remove contaminants from different compartments of the environment (ail, water and soil).

Indeed, nanomaterials offer the potential for the efficient removal of pollutants. Nanomaterials in various shapes/morphologies, such as nanoparticles, tubes, wires, fibres etc., function as adsorbents and catalysts and their composites with polymers are used for the detection and removal of gases, contaminated chemicals (nitrate, heavy metals, etc.) and organic pollutants (aliphatic and aromatic hydrocarbons). Nanomaterials show a better performance in environmental remediation than other conventional techniques because of their high surface area (surface-to-volume ratio) and their associated high reactivity

In addition, recent advances in the application of nanocomposite polymer materials for contaminant treatment and pollutant monitoring are also discussed.

However, the combination of nanomaterials and electroanalytical techniques for environmental monitoring seems very interesting for developing sensitive, inexpensive and field-usable devices for the detection of various environmental contaminants.

Sensitive detection and the effective removal or treatment of an increasing number of persistent and emerging environmental pollutants are major challenges. Now, these challenges can be better solved by using the benefits of nanomaterials in addition to electrochemical processes. This presentation first highlights recent applications of nanomaterials, electrochemical processes, monitoring and remediation. Secondly, it focuses largely on the application of nanomaterials in the environmental fields, in particular its application to monitoring and treatment, sanitation and detection (sensors) of various environmental pollutants with emphasis on on the rapid detection of pollutants.

Keywords: nanotmaterials, water remediation, air pollution, treatment, sensor, electrochemistry, Materials electrochemistry

Optimization of Oxytetraccline sorption on to iron modified montmorillonite

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Abstract

The sorption of oxytetracyclin, OTC, on an Iraqi certified clay mineral, montmorillonite saturated with ferric ion was studied. Design of Experiments was employed to evaluate the effect of operating parameters: antibiotic concentration (0.1-1.0 mM), amount of clay in water (0.5 – 10 g/L) and the pH value of the solution (3-10) on the adsorption efficiency. Batch equilibration experiments were carried out to follow the sorption behavior of OTC in aqueous solutions onto the modified clay mineral powderfor 24 hours. The residual concentration of OTC was determinedby spectral absorption at 360 nm. The sorption occurs over a wide range of pH values. The introduction of iron to the clay mineral improved the adsorption characteristics of the clay due to the ability of ferric ions to make 1:3, Fe:OTC stable complexes with the OTC. The effect of operating parameters on the adsorptive behavior of OTC on Fe-modified montmorillonite was discussed.
On using the optimum conditions, a mathematical model simulating the operation for the treatment was obtained as follows:

$$Eff\% = -0.467+0.160\ m + 0.839C_o +0.126\ pH -0.046\ m.C_o +0.041\ C_o^2 -0.071\ C_o.pH$$

Experimentally the OTC concentration could be decreased from 0.5 down to 0.03mM in synthetic wastewater at a pH value of 5.5 by sorption onto 6.85g.L^{-1} clay (montmorillonite)/L. The treatment with iron allows the use of lower clay material to perform the OTC removal.

Keywords: Oxytetraccline sorption**,** clay mineral, montmorillonite

Production of a new materials from Moroccan oil shale

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Abstract

Oil shale has constituted for a long time an economical hope for countries that possess important reserves of these rocks and that view to use them as an energy source substitute for petroleum Morocco, with estimated reserves of 93 billion tons, is increasingly looking at oil shale as an alternative energy source. A lot of studies have concentrated on oil shale located in Timahdit and Tarfaya, because of their high percentage of organic matter. Most of the studies focus either on the effect of various parameters on the yield and the quality of the oil obtained by conventional pyrolysis, or on the characterization of these oils by different physical and chemicaltechniques.

This paper explores the possibility to produce new materials, starting from the Moroccan oil shale, for different applications. More specifically, we aimed to demonstrate that the organic fraction of the oil shale could be used as precursors of low cost carbon fibres, adsorbent materials or graphitizable carbon, after appropriate chemical treatments resulting in a "maturation" of this organic phase. We also showed that this organic fraction of the Moroccan oil shale has interesting bioactive properties and that it could be used as a source of compounds with pharmaceutical interests.

Keywords: Oil shale; Adsorbent materials; Carbon fibers; Graphitizable carbon; bioactive properties

Friedel–Crafts reaction on calcined hydrotalcites materials

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Abstract

The structure of hydrotalcite (HT)-like compounds, also known as layereddouble hydroxides and anionic clays, can be described as containing brucitelikelayers. In this study, we aim to compare the following different types of catalyst: NiMgAl-HT, CoMgAl-HT, NiMgLa-HT, and CoMgLa-HT. These samples were prepared by coprecipitation at constant basic pH (pH 11). The obtained solidswere calcined at 450 °C. Hydrotalcite catalysts were characterized by atomic absorption spectroscopy (AAS), X-ray powder diffraction (XRD), Fourier-transform infrared (FTIR) analysis, and the Brunauer–Emmett–Teller (BET) method. The data obtained from chemical analysis of the calcined catalysts confirmed that the n (M^{2+}/M^{3+}) ratio is close to the intended value of 2. The XRD patterns confirmed thehydrotalcite structure. Room-temperature FTIR spectra were recorded in the rangefrom 4,000 to 400 cm^{-1} on a PerkinElmer spectrometer. These catalysts were testedfor the benzylation of by benzyl chloride reaction. Generally, the studies of activityshowed that the catalytic performance varies as follows: NiMgAl-HT[CoMgAl-HT[NiMgLa-HT[CoMgLa-HT[MgAl-HT andMgLa-HT.

Keywords: Catalytic benzylation, NiMgAl-HT, CoMgAl-HT, NiMgLa-HT, CoMgLa-HT Hydrotalcite, acido-basic properties,

Surfaces displaying quasi-instantaneous bacterial inactivation under low intensity indoor light

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Abstract

Many hybrid nanoparticulate metal-oxides combined films able to generate highly oxidative radicals have been investigated during the last decade. Many of these combinations were used for wastewater treatment under UV or solar light. Human activitiesare mostly situated in the indoor environment. However, although this environment is full of contaminations, very few efforts have been made to insure safer/cleaner indoor environment. We prepared hybrid composites for indoor bacterial inactivation in the dark and/or under indoor/actinic light. These composites were supported on different substrates (polyester, cotton, polyethylene, polyurethane) and were shown to lead to a quasi-instantaneous bacterial inactivation under low intensity actinic light [1-3]. The release of these elements/ions from the coated surfaces during the bacterial inactivation were below the cytotoxicity levels permitted by the sanitary regulations [4]. Cu and Ag are partially covered with their oxides when exposed to air and the composite Cu-Ag-polyurethane therefore contains amalgamated $CuO/Cu_2O/Ag_2O$. Due to the difference in redox potentials, Ag cangalvanically replace Cu in the sputtered thin film. The composite Cu-Ag- films involve the reactions Ag^0/Ag^+ -0.80V SHE and Cu^{2+}/Cu^+ 0.15V SHE. These reactions drive the Ag/Cu galvanic cell reactions with a potential of -0.65V SHE. The interfacial charge transfer (IFCT) mechanism of bacterial inactivation is suggested and the surface is characterized by up to date surface science techniques [5-6].

Keywords: Sputtered thin films, Antibacterial, Interfacial-charge-transfer (IFCT), Characterization.

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Oral Communications

Physico - Chemical analysis and Environment

Physico Chemical Analysis and Environmental Investigation of Thermal Spring in Tunisia

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Abstract

Tunisia has an important thermal potential and is well known since the Roman period. More than 80 thermal well located in the north Estearn of the Tunisia and also include 50 hot water springs. Thermal waters in this area have measured temperatures of 23-36°C, and electrical conductivities of 3,200 and 14,980µS/cm. Most of the thermal waters are characterized as Na-Cl type although there are a few Na-SO4-Cl waters. They issue from Miocene units which are made up sands and sandstones interbedded with clay. The Quaternary sediments cap the system. The heat source is high geothermal gradient which are determined downhole temperature measurements caused by graben tectonics of the area. The results of mineral equilibrium modeling indicate that the thermal waters of the Basin are undersaturated with respect to gypsum, anhydrite and fluorite, oversaturated with respect to kaolinite, dolomite, calcite, microcline, quartz, chalcedony, and muscovite. Assessments from various chemical geothermometers, Na-K-Mg ternary and mineral equilibrium diagrams suggest that the reservoir temperature of the area can reach up to 120°C. According to ^{18}O and ^{2}H values, all thermal and cold groundwater is of meteoric origin.

Keywords: Thermal, Spring, Physico-chimical, Environmental, Tunisia.

Removal of nickel from aqueous solution and industrial effluent by iron oxide

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Abstract

The increase of word population and industrial activities require water treatment. Recovery of heavy metal present in industrial effluent into natural material is one of the most technologies used as solution in the word.

The iron oxide sample worn out in this work was collected from the Djerissa iron minet in the north of Tunisia (Kef city). The specific surface area of iron oxide was determined using the standard Brunnauer, Emmett, and Teller (BET-N_2) method.

The adsorption of Nickel from synthetic and industrial water using batch system was carried out using iron oxide as support.

The isotherm of adsorption was examined. Several parameters such as pH agitation time and initial concentration were studied in order to assess optimal operating conditions.

The structure of the oxides is quite porous with mosaics indicating the absorbing amount quite favorable (Figure 1)

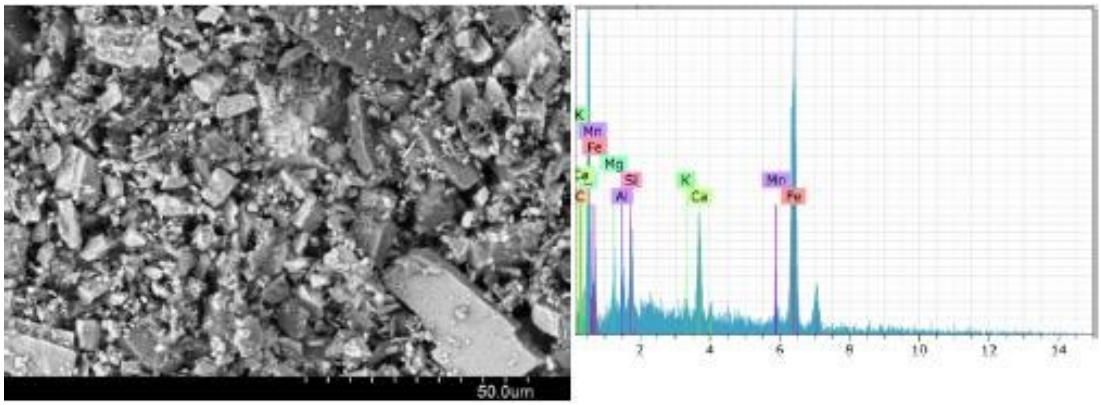

Figure 1. Scanning electron microscope of iron oxide

The kinetic equilibrium obtained at the end of two hours.

The result show high retention of Ni^{2+} exceeding 53.33 % for an initial concentration of 30 mg/L at 20°C, pH=7.9 and contact time of two hours.

The kinetic equilibrium obtained at the end of two hours. The adsorption capacity was 80 mg/g flowed Langmuir isotherms and the optimum pH founded was 7.9.

Iron oxide could be used as an adsorbent easily available and effective to eliminate toxic Nickel ions from industrial wastewater.

Keywords: Heavy metal, Iron oxide, Adsorption.

Photodegradation of methylene blue catalyzed by heteropolytungstates/SiO2 hybrid materials under Ultra-Violet irradiation

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Abstract

In this study, heteropolytungstates (PW9, P2W12, P2W15, P2W18, P4W24, P5W30, P6W18, and P8W48) were successfully immobilized onto silica aerogel (tetraethyl orthosilicate aerogel, TEOS) by a simple reaction, under mild conditions. These prepared hybrid materials were characterized by various techniques such as XRD diffraction, TGA, and IR to confirm their chemical and structural properties. Additionally, the FTIR, UV-Vis, BET, SEM and EDX techniques allowed the understanding of polyoxometalates loading and their distributions onto the surface of silica aerogels. The most important analysis, in this study, is the nitrogen adsorption-desorption technique that showed significant increase in the specific surface area and pore volume of the hybrid catalysts after the immobilization, thus enhancing the probability of the surface active sites. The photocatalytic activities of these photocatalysts were tested towards cationic Methylene Blue dye model (MB) under ultra-violet light irradiation. The results, obtained by UV-Vis and MS analysis, confirmed that the MB can be removed by photocatalysts with maximum degradation efficiency of 75% - 95% and 90% - 98% in 120 minutes, for POMs and POM-TEOS hybrids, respectively.

Keywords: Polyoxometalates, silica aerogels, immobilization, hybrid catalysts, Methylene Blue, photocatalytic degradation.

Existing land use and extent of Lead (Pb) contamination in the grazing food chain of the closed carmona sanitary landfill

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Abstract

Abandoning sanitary landfill without proper remediation and rehabilitation efforts poses risks to both humans and the environment. The sanitary landfill located in Carmona, Cavite, Philippines operated from April 30, 1993 to March 31,1998, is now a closed and abandoned landfill. At present, only grasses and shrubs thrive in the area. It is nonfunctional except to the nearby inhabitants who use the abundant vegetation for grazing of animals such as cows, goats and chicken. The possibility of heavy metal accumulation in the area is expected but is not yet determined. As such, the utilization of the area for productive land usehas not been explored. Hence, this study was conducted to determine the current land use of the study site; assess the extent of lead (Pb) contamination in the grazing food chain; and recommend the most practical and appropriate use of the land area. Grazing type food chain is the existing food chain in the landfill. Pb contamination in the area was detected in the weeds (1st trophic level), insects (2nd trophic level) and chicken's liver (3rd trophic level) with a mean level of 0.203 mg/kg, 0.053 mg/kg, and 0.080 mg/kg, respectively. The Pb level in the soil has an average of 1.357 ppm. The Pb level detected in the chicken's liver is beyond the Tolerable Daily Intake (TDI) for Pb set by the US FDA. The significant level of Pb presence in the soil makes it suitable only for recreational park or playground conversions. Remediation of heavy metals such as Pb is advised before any conversion.

Keywords: contamination, bioaccumulation, lead contamination, closed sanitary landfill, Carmona Cavite

Polyoxometalates Towards Water Hardness Treatment and Anti-bacterial Activity

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Abstract

Intensive research has been oriented towards the field of inorganic compounds, polyoxometalates (POMs), with various applications are encouraged due to their properties such as molecular reactivity and recognition with biological macromolecular target including polarity, surface load distribution, shape polarity, and acidity. POMs are anionic, nano-sized metal-oxygen clusters of early transition metals in high oxidation states such as Mo^{6+}, W^{6+}, and V^{5+}. The structural and compositional versatility of POMs is remarkable and is complemented by other tunable properties such as high stability, solubility and redox activity. POMs continue to attract intense research interest due to their outstanding structural diversity that gives rise to their vast application potential (including antiviral, catalytic, photochromic, or magnetic properties). We focus on the targeted development of novel functionalized POMs for catalytic applications including applications in chemical treatment of water for the purification from organic pollutants and taste & odor as well as toxic substances such as: heavy metals, bacteria, etc. for the final purpose of improving the quality and safety of water in Lebanon, with special focus on drinking and domestic water. First, we access new POM motifs and architectures, e.g. through systematic combinations of POM building blocks with cationic linkers. In addition to creating new structural motifs, we tune POMs for water treatment and purification purposes in order to study the activity of various POMs and mainly polyoxotungstates as catalysts for the removal of pollutants from water. Additionally, since increasing resistance of bacteria to antimicrobial drugs, mainly antibiotics, represents a major health-related problem today, therefore the antibacterial activity of some saturated polyoxotungstate compounds were also investigated. The obtained polyanion salts were characterized by infrared spectroscopy measurements in the solid state. This study shows that the different POM's present inhibitory activity against different gram-positive and gram-negative strains with an excellent biocidal effect and effectiveness in reducing bacterial growth. This is in addition to the evident activity of the studied POMs towards reducing the hardness levels of water, mainly calcium and magnesium divalent cations, which will permit to obtain a tap water with drinking water hardness standards.

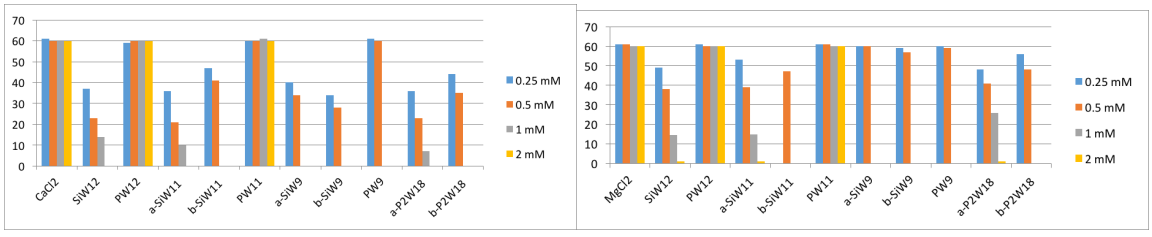

Figure 1: Hardness treatment of calcium (upper) and magnesium (lower) in water samples prepared with different POM concentrations.

Keywords: polyoxometalates, water treatment, hardness; anti-bacterial activity.

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Develop water depollution processes to remove medicinal residues such as Metronidazole and sodium salicylate

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Abstract

The objective of my research is to develop water depollution processes, to remove drug residues such as metronidazole and sodium salicylate. Both of these compounds are likely to end up in effluents from pharmaceutical industries and urban wastewater. The pollution extraction technique used is the liquid / solid extraction based on the adsorption phenomenon. The experimental study of the adsorption of metronidazole and sodium salicylate involves four substrates: 3 synthetic polymers (Polyaniline, Polypyrrole, PANi-PPy copolymer) and 1 natural biopolymer (wood). The pollutant extraction method was optimized through examining different parameters influencing the adsorption phenomenon: contact time, substrate mass, solution pH, initial pollutant concentration and solution temperature.
Based on the high adsorption yields obtained, the evidence suggests that the tested materials can be used to eliminate the derivatives of the drugs. The pH of the solution and the mass of the adsorbent play an important role in the adsorption phenomenon. The kinetics of adsorption is described by the pseudo-second order model. Examination of adsorption isotherms shows that the Langmuir model is best suited to model the experimental data. Examination of the thermodynamic parameters (ΔH °, ΔS ° and ΔG °) suggests that the adsorption processes are exothermic for metronidazole and endothermic for sodium salicylate.
Finally, a theoretical approach to the adsorption of metronidazole and sodium salicylate on PANi, PPy and the copolymer (polyaniline-polypyrrole) was carried out by the DFT method. The results of the various calculations corroborate the conclusions obtained experimentally.

Keywords: Adsorption; Wood ; DFT; Metronidazole; PANI-PPy; Polyaniline; Polymers; sodium salicylate.

Evaluation of water treatment residue as an sorption medium To adjust phosphate level in water

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Abstract

Wastewater treatment residual material from a local drinking water facility in Baghdad, was evaluated as a potential medium for the removal of some unwanted species from water. The material was first characterized by chemical composition, X-ray diffraction analysis prior to its use as an adsorbent. The x-ray revealed that the material is a complex mixture of calcium carbonate – silica with impurities of some oxides like MgO and FeO. The adsorption experiments started with the study of the removal of Methylene Blue dye from aqueous solution. Solutions with various concentrations of the dye were equilibrated with the sorbent for a variety of time duration. Excellent activity could be attained where adsorption capacity of mg (MB)/g of the residue. The material was then employed to control the phosphate concentration in water. Time and adsorbent amount plays significant roles in the removal of phosphate from water.

Keywords: water treatment residue, X-ray diffraction, methylene blue dye, removal of phosphate, spectrophotometry.

Effect of the synthesis method, complexing agent and solvent on the physicochemical properties of $LaNiO_3$Nanopowders.

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Abstract

$LaNiO_3$ Nanopowders are synthesized by sol–gel and sol-gel combustion methods using citric acid, ascorbic acid, sucrose, as chelating agents and ethanol, water as solvents. X-ray diffraction (XRD) and thermogravimetric, differential thermal analysis techniques areused to explore precursor decomposition and to establish adequate calcination temperature for the preparation of the nanocomposites.

The samples obtained after calcination at 800°C were characterized by XRD, Fourier transform infrared spectroscopy and powder size distribution.

Keywords: perovskite, $LaNiO_3$, sol-gel, combustion, chelating agent, solvent.

Comparative Chemical Composition of Green seaweed *Ulva Lactuca* and Green High Plant *Spinacia oleracea*

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Abstract

Higher Plant and Macroalgae offer an excellent source of a biologically active natural product as they are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities. In this study, we compare the chemical composition of *Ulva lactuca* and *Spinacia oleracea* and a correlation with different biological activity will be investigated.
Methods: Their chemical compositions were determined by chromatographic and spectrophotometric analyses. The various green solvents with a variable polarity such as water, acetone, ethanol, and ethyl acetate were used for the preparation of algal and spinach extracts then the dried extracts were investigated for their pigments content, polysaccharides, anions, organic acids and fatty acid profile.
The results show that *Ulva lactuca* and *Spinacia olerace* have similar content in chlorophyll a and b content (25 $mg.L^{-1}$). The highest total contents in sugar are shown in *Ulva lactuca* (77%), however, spinach contained 58%. The sulfates were the most abundant species for all extracts. Succinic acid contents of *Ulva lactuca* are above the content in *Spinacia oleracea* (10%). The maleic acid and phosphate compounds are higher in spinach (respectively 8% and 23%). In the fatty acid profile, the most abundant fatty acid was palmitic acid (C16:0) which in *Spinacia oleracea* accounted for 75% while the arachidic acid (C20:0) was the most abundant one (56%) in *Ulva lactuca*.
In conclusion, there is a variation on chemical composition between high green plant *Spinacia oleracea* and Green Macroalgae *Ulva lactuca*. In perspective, several biological activities (antimicrobial, antifungal, insecticidal…etc.) will be investigated and correlated with this variation of chemical composition.

Keywords: Green Seaweed, *Ulva lactuca, Green high Plant, Spinacia oleracea*, chemical analysis.

Adsorption des pesticides organochlorés sur un charbon actif préparé à partir de noyaux de dattes

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Abstract

Les pesticides organochlorés tels que les DDT, hexachlorocyclohexane (HCH) et la famille de Drin (aldrin, dieldrin et endrin) sont considérés comme les produits les plus dangereux. Ils sont utilisés pour augmenter le rendement des cultures. Malheureusement, ils sont très persistants dans l'environnement et ils ont tendance à s'accumuler dans les organismes pour provoquer beaucoup d'effets indésirables. Ce travail décrit les potentialités d'un charbon actif, préparé à partir de noyaux de dattes par voie thermique et traité chimiquement par l'acide phosphorique H_3PO_4, pour éliminer les pesticides organochlorés présent en solution aqueuse. L'effet de plusieurs paramètres tels que la dose de l'adsorbant (0.1-1 g), le temps d'agitation (30 et 120 min), la concentration initiale en pesticides (0.7-120 µg/L) et le pH de la solution ont été évalué. La quantification des pesticides a été réalisée, après extraction en phase solide, par chromatographie de gaz couplée à un spectromètre de masse GC-MS.
Le charbon actif préparé a été caractérisé par plusieurs techniques en mesurant à la fois l'indice de bleu de méthylène et celui d'iode pour déterminer la capacité d'adsorption (314 mg/g pour l'indice de bleue de méthylène et 507 mg/g pour l'indice d'iode). La surface spécifique a également été déterminée par adsorption d'azote à 77°K selon la méthode traditionnelle de Brunauer-Emmet et Teller avec un analyseur de surface BET-N_2 (Micrometrics FlowSorb III). La morphologie du matériau préparé a été contrôlée par microscope à balayage électronique (MEB) et la nature chimique par la spectroscopie infrarouge à transformée de Fourier FTIR. Les résultats obtenus montrent que le charbon actif préparé possède une structure poreuse développée, et une surface spécifique importante (>1200 m^2/g).
La capacité d'adsorption maximale des pesticides organochlorés sur ce charbon actif a été trouvée à un pHzpc est égale à 2 et l'équilibre d'adsorption a été atteint après 60 min de contact. Le traitement optimal a été obtenu avec de très faible quantité de charbon actif (4 g/L). Cette étude a démontré que les noyaux de dattes peuvent être utilisés dans la production d'un nouveau adsorbant à faible coût pour le traitement des eaux contaminées par les pesticides organochlorés.

Mots clés: noyaux de dattes, charbon actif, pesticides organochlorés, adsorption, acide phosphorique

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Characterization and Seasonal Variation of Tripoli Landfill Leachate in north of Lebanon.

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Abstract

Lebanon is facing a constant increase in waste production nationwide [2]. The political authorities have chosen Landfill Centre's as a cheap technique for waste management [3]. Theses landfills produce an effluent called leachate causes a harmful effects to the environment.

The main objective of this study is to investigate seasonal variations in the composition of leachate collected from the municipal landfill of Tripoli, from September 2017 to September 2018, during the dry and rainy season. In 14 sample, many parameters, such as Turbidity, conductivity, dissolved solids, temperature, and pH have been determined. Concentrations of organic compounds (COD, BOD5), nutrients (nitrogen, nitrates, nitrites and phosphorus), Chloride, Sulfate and alkalinity was analyzed using AFNOR method. Mineral compounds including Calcium, Magnesium, Manganese, Potassium, Iron, Copper and Zinc and trace metals (lead, nickel, cadmium, chromium) were analyzed using atomic absorption spectrometer equipped with furnace mode. The results showed a correlation between leachate compositions and seasonal variation throughout the year. As rainfall increased, organics concentration (COD) in leachate was increased from 19450 mg/l in fall to 29295 mg/l in winter also an increasing of DBO5 concentration from 8000 mg/l to 20000 mg/l was observed. The fluctuation of other indexes (phosphorus, chlorides, sulfate, dissolved solids, heavy metals) depended rather on season of the year. The maximum concentration of phosphorus is 201 mg/ where is monitored in winter, the concentration of chloride varied between 4091.6 mg/l and 11580.1 mg/l. regarding the analysis of metallic elements, the results showed that iron is the most metal found where the maximum concentration is 32.5 mg/l, an important presence of Zn (2.41 mg/l), Pb (2.04 mg/l), Cr (1.47 mg/l), Ni (0. 47 mg/l), Cu (0.26 mg/l) and Cd (0.095 mg/l) was observed. This indicate that the landfill was characterized by methanogenic conditions [1]. Which could be beneficial to find a specific treatment to decrease the environmental impacts in the long term.

Keywords: Leachate, Seasonal variation, physico-chemical parameters.

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Monitoring of organic pollutants in atmosphere: Recent innovations

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Abstract

The Earth's atmosphere is the seat of a transport of matter, in particular of organic pollutants of various origins, a significant proportion of which results from human activities. This phenomenon has serious consequences for the environment. The elements thus transferred are redeposited, in a complex way, on the surface of the earth, with a distribution map very unequal, possibilities of accumulation.

The major difficulty in monitoring air quality is that pollutants are generally found in low concentrations in the atmosphere as a result of the transport, dispersion and dilution processes [1]. In fact, in the atmosphere, the order of magnitude of the concentrations of pollutants is of the order of a few tens of pg.m-3. Biomonitors may provide a measure of integrated exposure over an extended period of time and are present in remote areas and no expensive technical equipment is involved in collecting them. They accumulate contaminants over the exposure time and concentrate them, thus facilitating analytical measurements. On the other hand, the mechanism of pollutant uptake and bioaccumulation in plants are mostly dependent on the physicochemical properties of the compounds but also on environmental and especially on plant [2]

In relation to the different physicochemical properties of these pollutants, the mechanism of retention on vegetation was studied for example, the lipophilic character of PAHs allows them to be transferred within lipid reserves of organisms and in cell membranes. [2, 3]

In recent years, mosses, lichens and pine needles have been studied to indicate levels of Organic pollutants in rural areas. [4, 5, 6]. The trends of temporal and spatial accumulation of organic contaminants in vegetation at a large scale are studded and recent advances in the development and application of biomonitoring for environmental analysis and monitoring of organic pollutants: OCP, PCB and HAP are reviewed in this presentation. [7, 8]

Keywords: biomonitoring, mosses, lichens, pine needles, PCB, HAP, OCP, rural area.

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Poster Communications

Physico - Chemical analysis and Environment

Adsorption of Cationic Dyes (Rhodamine B and Cristal violet) From Water Using Polyaniline (EB): Investigation of Kinetics and Isothermal Modeling

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Abstract

Water pollution has become a global issue of concern as human activities expand and climate change threatens to cause large alterations to the hydrological cycle. Dyes are one of the most easily recognizable environmental pollutants. Various industries such as textile, leather, cosmetic, paper, printing, plastic, rubber, pharmaceutical and food are the sources of pollutant dyes since they all use it in their products. For this reason, intense research attention has been paid to the removal of pollutants from wastewater. Among the various techniques, the adsorption has been considered as a promising solution to environmental problems [1,2].
In this work, we are interested in the study of the adsorption of cationic dyes Rhodamine B and Cristal violet using two form of polyaniline (PANI): Emeraldine Salt (ES) and Emeraldine Base (EB), both were synthesized by chemical polymerization. These polymers are able to act as an adsorbent of organic pollutants in the liquid medium. The influence of experimental parameters such as pH, solid/ liquid contact time, the initial concentration of pollutant and temperature of the adsorption were investigated. Kinetic studies indicated that the adsorption process follows the pseudo-second-order kinetic model. The Langmuir model fitted the experimental data much better than the Freundlich and Temkin models. The microstructure of the elaborated powders was studied by scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS), Fourier-transform infrared spectroscopy (FTIR). UV - visible spectrophotometry was used to follow the evolution of the discolouration of Rhodamine B (RhB) and Crystal Violet (CV).
The obtained results suggest that PANi (EB) could be of valuableinterest for the removal of different dyes from industrial textile wastewater.

Keywords: Polyaniline, Adsorption, Rhodamine B, Crystal Violet, Wastewater.

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Transfer of pollutants in the soil towards groundwater of the Kharraza plain N-E Algerian

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Abstract

Protection of water resources is one of the most important concerns of any environmental policy. These resources are identified as being of primary importance for the future. Their use should be carefully taken into account: Supply catchments (drinking water, industrial, agricultural ...). A simplified diagram of water resource pollution scenario includes: a source of pollution (deposition, leakage, discharge ...), A transfer process: vertical migration in the soil and subsoil to the groundwater (groundwater), Surface migration to a river (surface water), for example by runoff.The objective of this study is to evaluate the impact of chemical substances constituting pollution of water resources in the Western Plain of Annaba. And establish a vulnerability map to pollution in the aquifer of the study area. To show the relationship between soil and water in the surface layer of the plain of Kharreza, an ACP study was established means that: The waters of the superficial aquifer are loaded with high concentration of major chemical elements and low pH (Acid). On the other hand, the soil samples characterized by a low mineralization and a relatively basic pH. The application of Kherici's method has revealed a distinction between the different degrees of pollution and has allowed a neat classification of the reservoir in the study.

Keywords: Soil, Groundwater, Vulnerability, risk of pollution

The kinetic, Isotherm and Thermodynamics study of Cationic dye adsorption in presence of Sawdust Modified

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Abstract

In the present work, we are interested in the study of the adsorption of Methylene blue (MB) as a cationic dye. Simple methods to elimination of industrial dyes have been carried out, using natural materials such as the sawdust of wood. The chemical modification of the sawdust by the activating of carboxylic functions has been obtained with an excellent yield. These supports have been used for the extraction of the dyes in liquid phase. Different studies concerning the kinetics, the capacity, the pH of the solutions, the mass of the support and the temperature have been carried out. The pseudo second order kinetic model adequately described the kinetics of dye adsorption with high correlation coefficient (0.999). The dye adsorption increases from 9.75 to 64.60 mg/g on increasing the initial concentration from 10 to 200 mg/L. Higher solution pH (>4) favored the adsorption of reactive dye onto activated sawdust. Thermodynamic parameters like free energy (ΔG^o), enthalpy (ΔH^o) and entropy (ΔS^o) were also calculated.
The obtained results suggest that chemically activated sawdust could be of valuable interest for the removal of different dyes from industrial textile wastewater.

Keywords: Adsorption; Activated sawdust; Organic dyes; Wastewater

Etude de la pollution atmosphérique issue du secteur du transport routier

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Abstract

La pollution atmosphérique est l'enjeu environnemental primordial pour lequel des mesures adéquates doivent être engagées afin de freiner la détérioration de la qualité de l'air. Cette pollution atmosphérique a été le responsable des problèmes planétaires fondamentaux qui sont le changement climatique, le trou de l'ozone, les pluies acides, etc.
Aujourd'hui, les émissions de polluants provenant des véhicules routiers présentent la principale préoccupation pour le développement d'un transport moins nuisant. Avec l'explosion du trafic routier et la banalisation de la climatisation des voitures [1], le transport routier continuera de poser des problèmes environnementaux significatifs [2].
Emery Justin (2012) [3] a mené une étude en France sur les émissions des polluants dans le secteur du transport et il a signalé qu'il est la source principale des émissions.
La Tunisie, tout comme les autres pays du monde n'a pas pu échapper au fléau moderne de la pollution de l'air. Ce phénomène a pris de l'ampleur dans les grandes villes. Plusieurs facteurs sont à la base de ce phénomène à savoir l'accroissement rapide de la population, le développement commercial et industriel ainsi que le mauvais état du parc automobile qui a subi une croissance rapide etc.
Selon une étude de la qualité de l'air en Tunisie [3], il s'est avéré que le secteur du transport est la principale source de pollution ce qui a entrainé une dotation d'un programme de lutte contre cette pollution atmosphérique.
Dans notre travail, nous avons choisi de prendre l'exemple de l'une des villes les plus urbanisés à l'échelle nationale qui est la ville de Sousse (Tunisie) afin d'évaluer les émissions dues au trafic routier.
La méthode suivie dans cette recherche est basée sur le calcul des émissions globales dans le gouvernorat de Sousse en etudiant les polluants : CO, COV, NOx et PM en utilisant le logiciel Computer Program for Estimating Emission from Road Transport, .

Mots clés : Pollution atmosphérique, Emissions des polluants, Qualité de l'air, Transport routier.

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Oral Communications

Electrochemistry & new materials

Development of multi-modal and multi-level molecular systems

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Abstract

Over the past decade many efforts have been focused on the synthesis, modification and application of multi-responsive molecular systems[1]. Up to now, two main strategies have been conducted to elaborate such systems: either by connecting different molecular switches through covalent links[1, 2] or by mixing them within supramolecular assemblies to obtain multi-responsiveness through the combination of various stimulations (*i.e.*, photon, electron, proton, magnetic field, etc…). In this communication, we present a different approach based on the employment of indolinooxazolidine (BOX) unit as multi-modal switch. Indeed, the opening of the oxazolidine ring can be reversibly and selectively achieved either under UV irradiation, electrochemical stimulation or acidity changes. Moreover, the connection of two of them around a central pi conjugated core should lead to an enhancement of the number of available metastable states and allow the modulation of a property over several discrete levels. Nevertheless, the selective addressability of each subunit is still a quite challenging task in multi-switch system. Within this context, we want to take advantage of the existence of interactions through the bonds between both BOX units to assure their differentiation over some stimulation. Indeed, acido-, photo- and electro-chromic properties of the BOX units are not affected in an identical manner and lead to their global (referenced as all-in mode) or partial (referenced as stepwise mode) switch depending on the nature of the stimulation (see figure 1).For this study, we have prepared and explored the multimodal switching features of a first series of compounds which integrates a simple 2D aromatic plate forms, such as bithiophene, and EDOT-Thiophene-EDOT unit as spacer between the two BOX units, allowing to tune the redox potential of the system. Going further, in order to promote the metastable states, we tried to increase the number of BOX by connecting three of them on a more elaborated pi systems, such as tris (4-(thiophen-2- yl) phenyl) amine (TPA) and by playing on the arms of it. As supported by the performed spectroscopic characterizations, the acidic stimulation leads to global opening of BOX units in a successive manner. At the opposite, electrochemical stimulation assure a better control of the number of commutated BOX unit due to a strong variation of the redox potential with the oxazolidine ring opening.

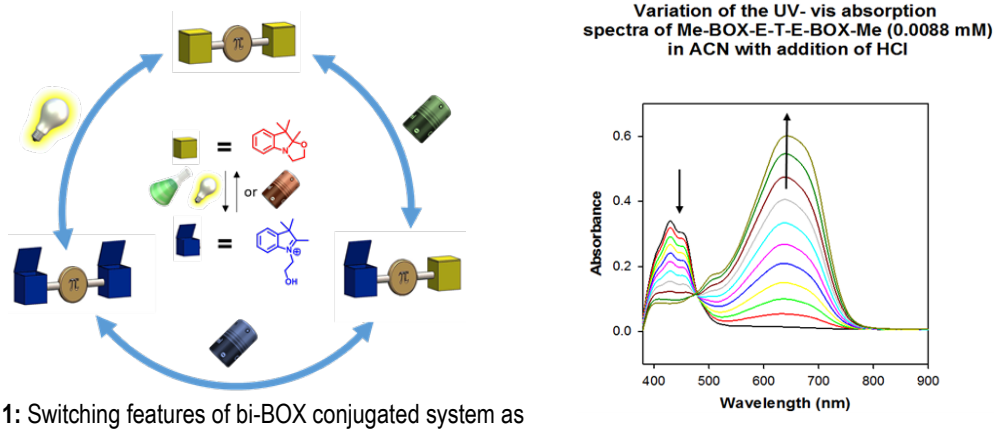

Figure 1: Switching features of bi-BOX conjugated system as multilevel and multimodal molecular system.

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New Chalcone Derivatives as Corrosion Inhibitors of Mild Steel in Acid Medium: Insights from Experimental and Computational Studies

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Abstract

A new class of chalcone derivatives, namely (E)-2-(4-(3-(2,5-dimethoxyphenyl)acryloyl) phenoxy) acetic acid **(AA-3)**, 2-(4-(3-(4-methoxyphenyl) propanoyl)phenoxy)acetic acid **(AA-2)** and (E)-2-(4-(3-(*p*-tolyl)acryloyl)phenoxy)acetic acid **(AA-1)** were synthesized and characterized. The purpose of the present study is to gain some insight into the protection of mild steel in 1M HCl using some biologically active molecules. For this purpose, various methods have been employed such as experimental and theoretical methods. These experiments confirmed that the chalcones derivatives show high inhibition activities and their adsorption on mild steel (MS) surface could be explained by a model of Langmuir adsorption isotherm, thus the thermodynamic and kinetic parameters were calculated and discussed. From potentiodynamic polarization (PDP) results, the studied compounds act as mixed type inhibitors. Electrochemical impedance spectroscopy (EIS) studies show that increasing of compounds concentration reveals an increase in polarization resistance and double-layer capacitance decreased. To understand the effect of temperature, the corrosion behavior of MS without and with the inhibitors at various concentrations was studied at the temperature range of 303 – 333 K.

In addition, to more understanding into the action mode of studied chalcones, quantum chemical calculations (DFT method) and Molecular Dynamic (MD) simulations were employed on the optimized structure of the studied molecules and its parameters were also determined and discussed. These researches were complemented by the characterization of the surface using Scanning Electronic Microscopy (SEM) and Atomic Force Microscopy (AFM) in order to confirm the protection of steel surface in the corrosive medium. As a result, we establish that the presence of more donating group (such as OCH_3) better facilitates the adsorption of molecules on the surface and consequently high inhibitory efficiency.

Keywords: Chalcone derivatives, Corrosion inhibition, Mild steel, HCl, DMol^3, Molecular dynamic simulation.

A Sensitive Electrochemical Sensor Based on Aluminium Doped CuSe Nanoparticles-modified Screen Printed Carbon Electrode for Determination of L-tyrosine in Pharmaceutical Samples

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Abstract

A simple method for the direct and quantitative determination of L-tyrosine was proposed in this work. Aluminium doped CuSe nanoparticles (Al-CuSe-NPs), were used to modify screen printed carbon electrode (SPCE) to study the electrochemical behaviors of L-tyrosine using cyclic voltammetry (CV) and linear sweep voltammetry (LSV) techniques. Al-CuSe-NPs were characterized by X-ray diffraction (XRD) and Scanning electron microscope (SEM). The results demonstrated that the Al-CuSe-NPs/SPCE exhibited high electrocatalytic activity and good analytical performance towards the oxidation of L-tyrosine. The linear range of L-tyrosine was 0.15–10 μM with correlation coefficient of 0.9974. The detection limit of the analyte was 0.04 μM. In addition, the Al-CuSe-NPs/SPCE displayed good reproducibility, high sensitivity and good selectivity towards the determination of the L-tyrosine, making it suitable for the determination of L-tyrosine in pharmaceutical samples.

Keywords: Aluminium doped, carbon electrode, Electrochemical sensor, L-tyrosine, Pharmaceutical samples

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Poster Communications

Electrochemistry & new materials

Oxygen Reduction Reaction on $La_{2-x-y}Nd_xPr_yNiO_{4\pm\delta}$ (x = 0, 0.3 and 0.5; y = 0 and 0.2) Materials in Alkaline Medium for Air-Zinc Batteries Application

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Abstract

The kinetics and mechanism of Oxygen Reduction Reaction (ORR) in alkaline medium has been studied electrochemically on lanthanum nickelate materials $La_{2-x-y}Nd_xPr_yNiO_{4\pm\delta}$ (x = 0, 0.3 and 0.5; y = 0 and 0.2) using the technique of the rotating disk electrode in a 0.5 M solution of NaOH. The oxide powders were synthesized by the citrate-nitrate method. Structural and surface characterizations were performed by X-ray diffraction (XRD) and X-ray photon-electron spectrometry (XPS), while the morphology was studied by scanning electron microscopy (SEM). Electrochemical studies were performed by linear volamperometry and impedance spectroscopy. The doped and undoped electrocatalyst composites ($La_{2-x-y}Nd_xPr_yNiO_{4\pm\delta}$ / C), were mixed from the rare earth nickel oxides and carbon black (Vulcan XC-72) and deposited as a thin layer on a glassy carbon substrate. At room temperature, the undoped electrocatalyst mixture shows single step kinetics unlike the doped materials. The strong doping by the rare-earth significantly favors the electrical conductivity of the electrode under air and the diffusion of oxygen, on the other hand the steric hindrance between the oxygen orbital between them and the orbital ($M\text{-}O_2$) influences the recovery of orbital ($M\text{-}O_2$) and leads to the change in kinetics and ORR mechanism. The structure, oxygen adsorption and oxidation states of the catalyst elements have a large influence on the mechanism and kinetics of the ORR. The electrocatalysts LNNO3 / C and LNPNO5 / C have better electrocalytic performance, which can in some cases be chosen as cathode materials for Zinc-air batteries.

Keywords: ORR process, Impedance spectroscopy, electrocatalyst materials, orbital

Adsorption and corrosion inhibition of mild steel in 1 M HNO_3 by 1,1'-methylenebis(5-methyl-1H-pyrazole-3-carbohydrazide) using experimental and theoretical

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Abstract

The inhibition effect of 1,1'-methylenebis(5-methyl-1H-pyrazole-3-carbohydrazide) (M1) on the corrosion of mild steel in 1 M HNO_3 was studied by weight loss, electrochemical impedance spectroscopy (EIS) techniques and potentiodynamic polarization methods. The results showed that (M1) was a good inhibitor in 1 M HNO_3 and inhibition efficiency increases with (M1) concentration to attain 91% at 10-3M at 308 K. E(%) values obtained from various methods used are reasonably good agreement. The adsorption of (M1) obeyed the Langmuir adsorption isotherm. Polarization curves showed that (M1) acted as a mixed-type inhibitor in HNO_3. Quantum chemical approach used to calculate electronic properties of the molecule to ascertain the relation between inhibitive effect and molecular structure.

Keywords: Mild steel, EIS, Corrosion, Weight loss, Electrochemical, DFT

Oral Communications

Materials/Nanomaterials for the Environment

The use of Magnetic Multiwalled Carbon Nanotubes Functionalized with Chitosan for Nitrate Removal from Wastewater

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Abstract

This study aims to synthesis magnetic multiwalled carbon nanotubes functionalized with chitosan, and then using it for removal of nitrate from wastewater. The resulting adsorbent characterized by TEM, ATR, XRD, TGA and Raman analysis. This porous material showed a very good thermal and chemical stability and hence it can be used as perfect adsorbent to uptake nitrate ions from wastewater.
The concentration of the nitrate in the filtrate was determined using UV-visible Spectrophotometer. The results showed that the resulting product has high adsorption efficiency. Also, it showed strong complexation properties with nitrate ions. In order to investigate the adsorption efficiency for the adsorption of nitrate onto magnetic multiwalled carbon nanotubes functionalized with chitosan the effect of solution conditions on each adsorption process were studied. These conditions involve the effect of contact time, pH value, temperature, adsorbent dose and the initial concentration of adsorbate. The best equilibrium isotherm model for each adsorption process was investigated according to the value of the correlation coefficient of Langmuir and Freundlich isotherm adsorption models. The kinetics of adsorption were also investigated using pseudo first-order, pseudo second- order and intra-particle diffusion kinetic models. In addition, Van't Hoff plot for the adsorption was investigated in order to determine the values of enthalpy change and entropy change, and hence determining if the adsorption process is spontaneous or not, and if it is exothermic or endothermic one. The results showed that the adsorption followed Frenndlich isotherm and the mechanism of the reaction followed pseudo first-order kinetic adsorption model. The thermodynamic parameters of the adsorption proved that this process is endothermic ($\Delta H > 0$) and spontaneous ($\Delta S > 0$). The synthesized adsorbent was also regenerated, and the percentage removal before and after adsorbent recovery is determined.

Keywords: Wastewater, Adsorption, Magnetic Nanoparticles, Nitrate.

Valorisation of natural resources, polymerization of b-pinene catalysed by a Montmorillonite clay

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Abstract

β-pinene issued from pine trees is an essential compound for fine chemical industry. It is the precursor of non toxic and inert poly(β-pinene) used as additive for rubbers, food packaging, casting industries and in the production of chewing gums. In this paper, we report an efficient and environmentally method to produce poly(β-pinene). We have used a Montmorillonite clay (Maghnite) as an heterogeneous non toxic catalyst to initiate (β-pinene) polymerization. Spectroscopic methods such as FT-IR, ^{1}H NMR, GPC chromatography and viscosimetric measurements were used to confirm the structure of the obtained poly(β-pinene). in order to find the optimal reaction conditions, Effect of temperature, reaction time, amount of catalyst, and solvent on the yield of the reaction and on the average molecular weight Mv of the resulting poly(β-pinene) were studied . The thermal properties (DSC) of the resulted poly(β-pinene) were also studied.

Keywords: β-pinene; poly(β-pinene); non-toxic catalyst; cationic polymerization; montmorillonite.

Adsorption of Methylene Blue from Aqueous Solutions by Vanadium-substituted Polyoxomolybdates

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Abstract

The main objective of this work is to study the effectiveness of three vanadium-substituted polyoxomolybdates, $[PMo_{11}VO_{40}]^{4-}$, $[PMo_{10}V_2O_{40}]^{5-}$ and $[PMo_9V_3O_{40}]^{6-}$, for the removal of methylene blue dye (MB) from an aqueous solution. These materials were synthesized and characterized using Fourier Transform Infrared spectroscopy (FTIR). Then the effect of various experimental factors such as contact time, adsorbent dose, initial dye concentration, pH and temperature were investigated in order to identify the optimum conditions for each parameter. The concentration of MB was measured before and after adsorption by using UV-visible spectrophotometer at 664nm.The synthesized compounds, which are negatively charged, showed high percentage of removal for the cationic dye. Optimized results for 25mg/L methylene blue exhibited only a contact time of 10min for $[PMo_{11}VO_{40}]^{4-}$ and $[PMo_{10}V_2O_{40}]^{5-}$while only 5min for $[PMo_9V_3O_{40}]^{6-}$.

Keywords: vanadium-substituted polyoxomolybdates, dyes removal, UV-Vis, methylene blue

Effet de la chaux éteinte sur le ciment Geopolymère à base de la pouzzolane Marocaine du moyen Atlas central

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Abstract

L'objectif de cette étude consiste-t-il synthétiser des géopolymères à base de la pouzzolane naturelle de la région d'Azrou (Moyen Atlas central Maroc). Le double intérêt escompté étant :
1/ la valorisation de la pouzzolane marocaine afin que son exploitation ait des retombées socio-économiques notables sur la région ;
2/ l'élaboration d'un nouveau ciment géopolymèrique performant et pouvant être proposé comme matériaux de construction alternatif au béton à base de ciment Portland ; ciment dont la fabrication reste hautement énergivore et polluante.
Dans un premier temps nous avons procédé à une caractérisation approfondie de la pouzzolane d'Azrou en faisant appel à plusieurs techniques d'analyses : l'analyse chimique (Fluorescence X) ; analyse par diffraction des rayons X (DRX) ; analyse infrarouge par transformée de Fourier (IRTF) et la quantification de la teneur en phase amorphe (méthode chimique).
Dans un deuxième temps, nous avons entrepris plusieurs expériences de synthèse de géopolymères à l'échelle du laboratoire. En dernier lieu, nous avons soumis le géopolymère correct obtenu à une série de tests technologiques. Celles-ci ont montré que notre géopolymère possède des propriétés physiques intéressantes et répondant aux normes de construction (densité = 2,05g/cm3 ; Porosité =5,13%, Absorption d'eau = 2,49% ; Vitesse des ondes ultrasoniques = 2205 m/s et une très faible conductivité thermique (ordre de 0,06969 W/m*K).

Keywords : géopolymères, IRTF, DRX, Fluorescence X.

Poster Communications

Materials/Nanomaterials for the environment

Graphene- $CoFe_2O_4$ Magnetic Nanohybrids for Efficient Removal of Cyanide from Wastewater

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Abstract

There are many contaminants that seep into soil and groundwater and cause many health problems for both humankind and animals. This research concentrated on removal of Cyanide from water using produced magnetic cobalt ferrite ($CoFe2O_4$) that was characterized by several spectroscopic and analytical techniques, such as, SEM, TEM, XRD, FTIR VSM and TGA. Characterization of the magnetic material showed rough and porous nature indicating that magnetic ($CoFe2O_4$) presents good characteristics to be employed as an adsorbent. The adsorption experiments were conducted for a wide range of temperature, adsorbent dosage, pH, initial concentration and contact time. It was observed that concentration increase the amount of CN adsorbed was decreased and temperature while it increased with increase in solution pH, contact time and adsorbent dose. Over 95% removal efficiency of CN was achieved after 25 min, at solution pH around 3.5 and 20°C temperature using 0.25 g weight of dose and initial concentration of 15 mg/L of 50 mL CN solution.
The sorption of CN on the ($G\text{-}CoFe_2O_4$) was optimized under acidic conditions and temperatures around temperature of 15 °C. CN sorption using (G-CoFe2O4) can be described using pseudo second order and Langmuir isotherm model. Based on the results, the ($G\text{-}CoFe_2O_4$) is able to remove CN rapidly within 25 min with a promising removal efficiency.
The negative ΔG° values (-14.548to -12.595 KJ/mol) indicate that the adsorption is favorable and spontaneous at these temperatures. The negative value of ΔH° (-38.9 KJ/mol) reflects an exothermicadsorption and indicates that the adsorption is favored at temperature of 15oC. The value of ΔH° was higher than those corresponding to physical adsorption. This would suggest that the adsorption process is chemical in nature. The positive value of ΔS° (+83.14 J/mol.K) suggests that some structural changes occur on the adsorbent and the randomness at the solid/liquid interface in the adsorption system increases during the adsorption process.

Keywords: Wastewater, Adsorption, Magnetic Nanoparticles, Cyanide.

Optimization of the parameters of obtaining chitosan and its applications in the treatment of wash water from the TAKSEBT potabilization station

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Abstract

The objective of our work is the recovery of marine by-products waste (shrimp shells) in order to optimize of chitosan by demineralization, deproteinization, bleaching and deacetylation to 45 % NaOH by weight for 6 hours at 140 °C. However, the deacetylation was carried out at 35 % NaOH by weight, at 20 and 120°C. These conditions allowed to have chitosan with different DDA, characterized with high molecular weight (MW). In addition, the elimination of the deproteinization step resulted in chitosan of better characteristics than with deproteinization one.
The application of these washing samples in the water treatment of water dam of Taksebt has given very promising and interesting results, which reaches and abatement rate higher than 95 % after the first 5 minutes.

Keyworks: Waste recovery, shrimp shells, optimization, chitosan water treatment

Numerical Simulation of Armed Earth

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Abstract

Armored Earth structures combine selected and controlled granular backfill, strong steel or synthetic reinforcements and a modular cladding system typically consisting of prefabricated concrete panels, welded mesh or semi-elliptical steel panels.
Armed earth is a reinforcement process that uses non-corroding metallic or synthetic reinforcements, working in tension to bring some cohesion between the ground and the reinforcement, the presence of reinforcements thus improves the overall mechanical properties of the earth which can be a Solution to many problems.
We are interested in our work in the first part to a detailed study on the constitutive elements of the Armed Earth as well as the interaction underfloor; And in the second part, verification of the stability of the reinforced earth retaining wall.
The deduced parameters have been implemented in the Numerical Calculation Numbers Talren and then Plaxis for the study of the safety stability as well as the influence of several parameters on the behavior of the structures in Armed Earth.

Keywords: Armed earth, soil, synthetic reinforcement; stability; numerical modeling Talren; Plaxis.

Efficiency of magnetic chitosan supported on graphene for removal of perchlorate ions from wastewater

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Abstract

One of an emerging trace contaminants is perchlorate that has been detected in surface water, ground water, soil and food globally. Cross linked Magnetic Chitosan / Graphene Oxide Beads (CM/GO Bs) were synthesized and tested to remove perchlorate anions from waste water.
The complex was characterized by transmission electron microscopy, Fourier Transformation Infrared spectroscopy and vibrating sample magnetometry.
The effect of pH, contact time, co-existing anions and temperature on adsorption was investigated. Particles could be recovered easily by external magnetic field because they were super-paramagnetic. The CM/GO Bs complex could adsorb perchlorate in a wide range of pH from 4 to 10 . Co-existing anions may inhibit the adsorption of perchlorate on CM/GO Bs.
Kinetic data were well fitted to the pseudo-second-order model. The enthalpy and negative gibbs standard free energy show that the adsorption process was exothermic and spontaneous. the exhausted adsorbent can be regenerated well by 0.1% NaCl solution.

Keywords: Magnetic Chitosan, graphene, Perchlorate ion, adsorption.

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Oral Communications

GeoEnvironment and Materials

Durcissement structural des alliages Pb Cd Mg et Pb Cd Mg Ag pour les grilles de batteries

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Abstract

Les travaux de recherches sur les alliages du plomb connaissent un essor croissant tant pour l'étude fondamentale de leurs propriétés structurales que pour leurs nombreuses applications dans l'industrie automobile. En effet, pour des raisons écologiques et économiques, beaucoup de recherches ont été effectuées afin d'augmenter les performances de l'accumulateur au plomb en vue de son utilisation comme source d'énergie dans la voiture électrique. L'enjeu est donc de sélectionner un alliage possédant une bonne tenue à la corrosion et des propriétés mécaniques améliorées.
Cette recherche porte sur l'étude des mécanismes du durcissement structural des alliages à base de plomb pour la nouvelle génération des grilles de batteries. Le durcissement structural consiste en une série de traitements thermiques qui provoquent l'apparition d'un précipité. Ce précipité bloque les déplacements des dislocations et durcit le métal. Nous avons travaillé sur les systèmes ternaires Pb Cd Bi et Pb Cd Mg auxquels nous avons allié, pour le premier, l'étain (Sn), le magnésium (Mg) et l'argent (Ag) et pour le deuxième, L'argent (Ag) dans le but de déterminer l'influence de chaque élément dans l'alliage mère.
Cette Communication est consacrée à l'étude du durcissement structural des alliages Pb-Cd-Mg et Pb-Cd-Mg-Ag. Le retour vers l'état d'équilibre de ces alliages a été étudié par différentes techniques expérimentales à savoir : dureté, microdureté, microscopie optique et diffraction des rayons X. Deux états structuraux sont considérés: l'alliage brut de coulée et l'alliage réhomogénéisé. Les températures explorées sont 20°C et 80 °C. Cette dernière température est choisie parce qu'elle correspond à la température de mûrissage des plaques des batteries ainsi qu'à la température extrême de son fonctionnement
L'évolution de la structure de trempe des alliages Pb-Cd-Mg vers l'état d'équilibre se fait en deux stades : le premier est caractérisé par une transformation discontinue durcissante, le deuxième se manifeste après un survieillissement, il est caractérisé par une précipitation discontinue grossière adoucissante. L'ajout du magnésium augmente légèrement la dureté et ralenti la cinétique de la transformation durcissant. Pour l'alliage Pb-Cd-Mg-Ag, les phénomènes de vieillissement et de survieillissement sont similaires à ceux des alliages Pb-Cd-Mg. L'influence de l'agent se traduit par une légère augmentation de la dureté. L'influence de l'augmentation de la température réside en une accélération de la cinétique de transformation. La réhomogénéisation a peu d'influence sur la dureté.

Mots clé : durcissement structural, précipitation, dureté, Environnement, Alliage de Plomb

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Oral Communications

Advanced techniques for surface
& Materials characterization

Catalytic oxidation of isopropyl alcohol over Pt/$Al_6Si_2O_{13}$: A study of the effect of methyl cellulose on Pt particles dispersion over mullite

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Abstract

Total catalytic oxidation of isopropyl alcohol (IPA), used in fragrance lamp industry, remains one of the most popular techniques to remove indoor environmental pollutants; such as, Volatile Organic Compounds (VOCs). Many catalysts based on platinum were already used in such technique. In our study, catalytic oxidation of IPA was investigated on catalysts based on platinum (0.6 wt.%). Mullite ($Al_6Si_2O_{13}$) known for his excellent thermal stability and thermal shock resistance was used as support. Pt/Al6Si_2O_{13} catalysts were prepared by impregnation using Pt tetramine as a precursor in two different ways, with and without using Methyl Cellulose (MC). These catalysts were tested in order to study the influence of MC on the platinum particles dispersion over the support.
The catalytic reactivity of these catalysts were also investigated and compared with Pt/α-Al_2O_3 and Pt/SiO_2. Furthermore, the resulting materials were characterized by BET, X-Ray diffraction (XRD) and Transmission Electron Microscopy (TEM). H_2-chemisorption was also used to determine the dispersion of platinum particles. As a result, Pt/$Al_6Si_2O_{13}$ prepared with MC showed better activity performance than the one prepared without MC. This can be explained by the fact that the addition of MC enhanced the Pt dispersion over mullite leading to an improvement in the catalytic activity and the selectivity into carbon dioxide.
This study presents scientific findings concerning the use of methyl cellulose as a dispersing agent in the synthesis of catalysts. These results demonstrated the capability in utilizing hydrogel based methyl cellulose in a variety of industrial applications in which it can be used as great dispersing agent.

Keywords: catalytic oxidation, isopropyl alcohol, methyl cellulose, mullite.

Mg_3/Al- Layered Double Hydroxide as Heterogeneous Basic catalysts for Kneovenagel Condensation

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Abstract

Kneovenagel condensation reactions constitute the largest diversity of heterocyclic compounds and the most varied family of organic chemistry that yields a simple and easy formation of double bond Carbon-Carbon. The efficacious development synthesis of heterocyclic molecules is an enthralling field of research. The present work endeavors the novel cyclization of intermolecular delivery of N-dicétophénylpyrazole and substituted aromatic aldehyde by applying of Mg/Al-Layered doubles hydroxides as solid base catalysts. This latter is prepared by co-precipitation method, with ratio Mg^{2+}/Al^{3+} = 3, at pH 10. And the physicochemical characterization has been done by XRD, TG-DTA, IR and BET.

Keywords: Heterogeneous catalyst, Mg/Al-Layered Double Hydroxide (LDH), Kneovenagel Reaction and heterocyclic compounds.

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The effect of Europium in structural and optical study of the systems $(Gd_{1-x}Lu_X)_3Al_5O_{12}$.

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Abstract

$(Gd_{1-x}Lu_X)_3Al_5O_{12}$ doped Europium Garnet composition present an important interest in structural and optical properties, the presence of Gd in this compound gives advantages over the photoluminescence of the activators ions (rare earth elements) due to the low value of the electronegativity of Gd with respect to the yttrium ion.
The inconvenient of Garnet containing Gd is not being formed by this ion only, because its large size prevents the formation of the single-phase, so it requires a compensation with an others ions to establish the substitution of Gd^{3+}.
For this raison we have tried to develop and to elaborate compositions of type $(Gd_{1-x}Lu_X)_3Al_5O_{12}$ (x = 0, 2 - 0, 3) doped 5 % Eu_2O_3 in this work, by the solid state reaction method, in order to see the different effects like the percentage of Gd which gives us its limit from which we will find a garnet single-phase. We have realized DRX analyses on these synthesized powders.

Europium ion is also interesting from a structural symmetry point of view in host material by determination of $^5D_0 \rightarrow {}^7F_J$ transitions in the luminescence spectrum we realized spectra emissions by an excitation at a wavelength equal to 360nm, therefore we confirmed the structure of this compound confirm. FTIR analyses have shown the active internals vibrations modes associated with the different frequencies of the materials.
We have illustrated how the maximum amount of information can be extracted from structural and optical luminescence spectra of europium in Garnet compounds containing Gd.

Keywords: Europium, Lanthanides, Luminescence Garnets materials

Poster Communications

Advanced techniques for surface
& Materials characterization

Structural study and the effect of ionic size of the systems (Gd1-x LuX) $_3Al_5$ O_{12} doped Erbium

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Abstract

The structure of the perovskites and the cubic garnets multi-components materials of particular interest, these materials doped rare earth of weak or wide ionic radius recently led to obtain the thermodynamically stable phases **[1].**
In this work, we have chosen the development of compositions of type **($Gd_{1-x}Lu_x)_3Al_5O_{12}$ (x = 0, 2 - 0, 3)** doped **5 %Er_2O_3** and **5 %Eu_2O_3** in order to understand the effect of the ionic size of the rare earths on the Crystal structure, the polycrystalline powders were prepared by the method of reaction in the solid state at high temperature. Extensive x-ray diffraction analysis of these crystal structures was presented. A complementary study by FTIR spectrometry was conducted to consolidate our results. **DRX** analyses on these synthesized powders, confirmed the results of the phases of **$GdAlO_3$** perovskite as the majority phase due to the content with higher gadolinium because of the large ionic size of this element, this element present few limits to land starting from the equilibrium diagram of this element, which showed the limit of rare earths of the phase diagram binary **Al_2O_3-Ln_2O_3** which presents the perovskite and Al2O3 phases in the case of ionic radii of **Ln^{3+}** is wider than that **Gd^{+3} (r_{Gd}=1,053 A° of Coordination Number (CN)=8).** According to these reasons, it is important to substitute **Gd^{3+}** ions in dodecahedral site by elements which have low ionic sizes in order to stabilize the garnet structure of composition. Our objective is to establish the substitution of **Gd^{3+}** by Lutetium and erbium trivalent ions that have low ionic radius **(r_{Lu} = 0,977 and r_{Er} = 1.004 A° has ° for CN = 8 respectively**). In other way we tried to substitute **Gd^{3+}** by **Eu^{3+}** which is wider to have the behavior of this element on the structure of solid solution ,because **$Gd_3Al_5O_{12}$** is metastable garnet materials but it stabilized with Lu^{+3} and doped by ions larger than **Gd^{3+},** such as **Eu_2O_3 (r_{Eu} = 1.066 A °),** which forms stable garnet phases **[1]. FTIR** analyses have shown the active internals vibrations modes associated with the different frequencies of the gadolinium perovskite materials **[2]** also are confirmed through phases appeared by DRX and the characteristic IR absorption bands of **M – O (M: metal components Gd or Al)** within the matrix **($GdAlO_3$)** are started to appear through the IR spectroscopy with the appearance of other externals modes as **C-O,C-H,O-H.**

Keywords: Perovskites and Garnets materials, ionic radius, DRX, FTIR.

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Investigation of corrosion inhibition effect of vitamin B1 on copper in 1M HNO3 solution: electrochemical study and surface analysis

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Abstract

Corrosion prevention systems favor the usage of chemicals with low or no environmental impacts. In this content, the usage of some of the inhibitors has been restricted due to the toxicity, and their insufficient inhibitory efficiencies at low dosages. Therefore, the studies have begun to focus on finding novel, cheap, non-toxic, healthy and effective corrosion inhibitors. Vitamin B1 (VitB1) is a non-toxic compound and could be easily extracted from natural foods. VitB1 molecule contains many π electrons as well as one oxygen, one sulphur, and four nitrogen atoms which are assumed to be adsorption centers. The presence of such adsorption centers in the molecular structure is expected to cause an easier electron transfer from the functional groups to the metal surface which provides greater adsorption ability and corrosion inhibitory efficiency. The large size and high molecular weight of this compound could also contribute to its inhibitory efficiency. The good water solubility is another advantage for its practical applications as corrosion inhibitor.

Due to its unique advantages, which are described above, the VitB1 was investigated as potential corrosion inhibitor for copper which is widely used in industrial applications as and could exposed to corrosive medium. For this aim, potentiodynamic polarization, electrochemical impedance spectroscopy (EIS) and linear polarization resistance techniques were used. Surface of the metal exposed to corrosive medium was investigated by scanning electron microscopy. The average percentages and distribution of some elements, which are assumed to be responsible for adsorption, were determined by energy dispersive X-ray spectroscopy. It was found that VitB1 acts by adsorption on copper surface and a protective film formation. The inhibitor film evenly distributes over the steel surface. The surface inhibitor film inhibits corrosion of copper in 1.0 M HNO_3 solution. Surface charge of Cu was determined by EIS method and an inhibition mechanism was proposed.

Keywords: Corrosion , copper, Vitamin B1, SEM-EDX, AFM.

This abstract has been publihed recently July (2018) at : (https://www.univ-setif.dz/OCS/ICMS2018/ICMS/paper/view/1296/0)

Caractérisation d'un réfractaire à base de kaolin DD1 de l'est de l'Algérie

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Abstract

Les matières premières à l'origine de l'élaboration des matériaux réfractaires du système silice-alumine sont fréquemment rencontrées dans la nature, parmi elles se trouvent les kaolins. Ces matériaux peuvent être des bons candidats pour la fabrication des briques réfractaires. L'objectif principal de ce travail de recherche est l'étude d'un matériau céramique localement produit dans le but de l'utiliser comme réfractaire.

Les céramiques thermomécaniques sont des matériaux à haute performance dans un large intervalle de température. Elles peuvent être utilisées dans des conditions spécifiques pour résister aux contraintes liées, par exemple, à la haute température et aux agents corrosifs.

Les matériaux réfractaires sont largement utilisés dans différents domaines de l'industrie et présentent une importance stratégique car elles répondent à plusieurs exigences techniques. Il est utile, donc d'améliorer les propriétés de ces matériaux pour augmenter leurs performances.

Pour atteindre un tel objectif, la connaissance de l'évolution des variables d'état à tout instant est nécessaire pour optimiser et mettre en valeur les procédés d'élaboration et de transformation d'une céramique locale en l'occurrence un Kaolin de la région de Guelma (Djbel Debegh) DD1. La compréhension des propriétés mécaniques et thermiques du matériau réfractaire et la maitrise des procèdes de caractérisation sont nécessaires. L'étude structurale et microstructurale de la matière première avant traitement thermique est faite, notamment sur sa nature cristallographique ou encore sur la taille et la forme des grains. L'analyse thermodifférentielle et thermogravimétrique (ATD et ATG) confirme les résultats minéralogiques effectuées par diffraction des rayons X (DRX) des échantillons frittés à différentes températures à savoir 1200, 1300, 1350, 1400°c; les pics ATD caractéristiques d'une kaolinite sont bien présents. Au cours du traitement thermique, on a assisté donc à une suite de transformations allant de la métakaolinite à la mullite en passant par un état amorphe. Ce sont les propriétés mécaniques qui vont influencer la résistance aux différentes sollicitations mécaniques et aux chocs thermiques, un teste de microdureté des échantillons élaborés est effectué, les résultats obtenus nous ont renseigné sur la dureté du matériau jusqu'à un seuil de 1300°c ou nous avons noté une diminution de la dureté à 1400°c, à différentes forces appliquées nous n'avons pas détecté une propagation de fissures pour calcul de ténacité.

Keywords : kaolin, réfractaire, caractérisation, élaboration, traitement thermique.

Oral Communications

Electrochemical & Environmental Materials

Electro-Fenton regeneration of carbon monolith adsorbents used as cathode materials

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Abstract

Compared to conventional fixed beds of granular activated carbons, carbon monoliths have the advantages of low pressure drops, large surface area (> 1100 $m^2.g^{-1}$) and short mass transfer zones [1, 2]. Carbon monoliths are prepared either by the coating of carbonaceous materials on cordierite substrates or by direct extrusion [3]. Although these adsorbents are more expensive than grains or powders of activated carbon, economic benefits could be expected if an efficient way of regeneration is found for long life cycles (multiple adsorption/desorption steps). For gas filtration, thermal desorption was evidenced for the removal of organic volatile compounds using the Joule effect. This approach cannot be applied in aqueous treatment since the specific heat of water is much higher than air and would result in high energy consumption. Benefiting from the advantage of a continuous medium, electrochemical alternatives for the desorption/degradation of organic compounds in the liquid phase could be developed. Electrochemical regeneration refers to the recycling of a used adsorbent by advanced oxidation reaction involved *in situ* electro-generated radicals. The regeneration implies desorption and/or destruction of the adsorbed organic matter; thus maintaining its adsorptive capacity for multicycle use.

In the present study, an experimental pilot (showed in Figure 1) was designed to carry out adsorption/desorption cycles and an electrochemical flow cell designed by 3D printing containing a slice of carbon monolith. Electro-generated radicals are produced inside the carbon monolith, which is placed in an external column. In this study, a pharmaceutical residue (diclofenac) was used as pollutant probe. It was, first, adsorbed onto the carbon monolith. Then, the adsorbent was used as an electrode for the regeneration process. H_2O_2 production and electro-Fenton ($HO^{\bullet}$)) processes were studied and optimal operating conditions defined. The ultimate step of the electrochemical regeneration process is the complete mineralization of the adsorbed compounds into CO_2 and H_2O and inorganic ions. However, an efficient desorption might only require a partial conversion/oxidation of the pollutants into less adsordable by-products. So far, the reactivity and the chemical schemes were determined in the liquid phase and at the solid-fluid interface (external surface of the monolith). However, several questions remain about the reactivity of organic compounds adsorbed in the micropores. Interesting perspectives were enlightened for the generation of radical species inside the porosity for a direct and local oxidation of the target compounds.

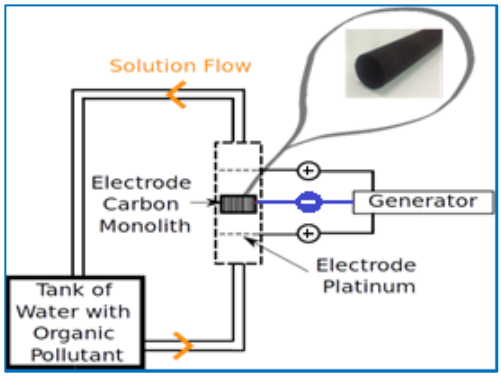

Figure 1. Experimental unit conception for adsorption/desorption study on

Keywords: carbon monolith, adsorbent regeneration, Electro-Fenton, Flow cell design, Dichlophenac

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Polyoxometalates as Photocatalysts for Atrazine Degradation

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Abstract

High Performance Liquid Chromatography coupled to UV detector (HPLC-UV) was used to evaluate the photocatalytic effect of tungstosilicates and tungstophosphates on the kinetic degradation of Atrazine under UV irradiation at 254 nm for 90 minutes. Polyoxometalates with a silicon heteroatom showed better photocatalytic activity than the phosphorus counterpart. The Keggin-type polyoxometalate $[\alpha\text{-}SiW_{12}O_{40}]^{4-}$ was the most effective photocatalyst among all the studied oxometalates. 90% of Atrazine was decomposed in the presence of $[\alpha\text{-}SiW_{12}O_{40}]^{4-}$ at pH of 2.13 after 60 minutes of UV irradiation. Octatetracontatungstooctaphosphate polyanion $\{P_8W_{48}\}$ yielded the highest degradation percentage (74%) among the examined phosphotungstates' family. An increase in the photocatalytic efficiency was observed as the number of addenda atoms (Tungsten-W) increases in the metal oxide clusters. The tests carried in dark were not efficient in the degradation of atrazine, therefore the presence of UVA irradiation was found critical in treating atrazine contamination. Atrazine-2-hydroxy (HAT) was the dominant degradation product whereas Atrazine-desethyl (DEAT) marginally appeared.

Keywords : Atrazine, Polyoxometalates, Degradation, Photocatalysts

Development of electrochemical micro-sensors for the detection of organic pesticides residues

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Abstract

In spite of their importance to maintain a sufficient plant production, many of the pesticides used in agriculture are long time persistent [1] and very toxics for human health (cancers, genetic disorders…) [2]. Hence the pesticide analysis in the environment is crucial and traditionally uses the chromatography techniques coupled with selective detectors systems. These techniques are relatively expensive and require long time for preparation and analysis of samples [3-4].
In our project, we develop new electrochemical micro-sensors for the trace detection of targeted pesticides with nanostructured composite materials introduced in cavity microelectrode (CME) as sensing electrode. For electroactive pesticides, this strategy is an alternative to chromatographic methods due to its operation simplicity, acceptable sensitivity, wide linear concentration range, low limit of detection and quantification, possibility of miniaturization, affordable cost of instrumentation, and relatively short analysis time.
In this work, traces of Pesticides are detected with the micro-sensors by cyclic voltammetric techniques after an adsorption step on the composite material include in a cylindrical microcavity(Ø = 50 µm, h = 17 µm). Carbon pastes in the CME electrode are constituted by micro-sized carbon powders mixed with multiwalled carbon nanotubes and copper oxide or by adsorption solid phase. Now four pesticides(isoproturon, linuron, fipronil and bentazon) have been studied. Times for the adsorption and conditioning steps, cyclic voltammetry parameters and composition of the electrolyte have been optimized.
The best results are obtained with isoproturon (ISO) with a notable detection limit of $4x10^{-10}$ mol.L^{-1} in aqueous acid medium and 4x10-8 mol.L-1 in electrolyte containing acetonitrile. The calibration curves were linear from 10^{-8} mol.$L^{-1}$to 10^{-6} mol.L^{-1} and it appears that, for water samples, standard addition method is recommended to a better accuracy.
Actually, we detect traces of ISO in aqueous and organic solutions. We should expect the detection in vegetables samples after extraction by ACN.

Keywords: Pesticidesanalysis, electrochemicalanalysis, cavitymicroelectrode, carbonpastes, microsensor.

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Poster Communications

Electrochemical & Environmental Materials

A Theoritical and experimental study of the inhibition of the corrosion of Steel carbone in HCl by using of new molecule dirived by quinolone

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Abstract

In present study of the inhibition of the corrosion is made by a molecule derived from Quinoline in 1.0 M HCl using gravimetric, electrochemical impedance spectroscopy and potentiodynamic polarization. From electrochemical impedance measurements, it is observed that inhibition efficiency increases with concentration of this molecule and maximum efficiency reached is 95 % at 10^{-3} M. The potentiodynamic study reveals that molecule is a mixed type inhibitor with predominate cathodic action by blocking the active site of the metal. EIS plot indicates that the addition of inhibitor increases the charge transfer resistance and decreases the double-layer capacitance C_{dl} of the corrosion process. The adsorption process follows Langmuir isotherm via chemical adsorption. The results obtained from the different methods are in good agreement. Arrhenius law and its transition equation lead to estimate the thermodynamic parameters and to conclude that adsorption is predominantly chemisorption, exothermic and support the mechanism of chemical adsorption of the corrosion process. Quantum chemical calculations were carried out to investigate the corrosion-inhibiting property of this inhibitor.The theoretical calculation was investigated using the Density Functional Theory (DFT) and simulation Montecarlo based on Beck's three-parameter exchange functional and Lee–Yang–Parr nonlocal correlation functional (B3LYP) and the 6-31G(d,p) orbital basis sets for all atoms as implemented in Gaussian 09 program. The calculated quantum chemical parameters are the highest occupied molecular orbital energy (E_{HOMO}), lowest unoccupied molecular orbital energy (E_{LUMO}), energy gap (ΔE), dipole moment (μ), electronegativity (χ), electron affinity (EA), global hardness (η), softness (S), ionization potential (IP), fraction of electrons transferred (ΔN), global electrophilicity (ω) and total energy. The results obtained from weight loss, electrochemical methods and theoretical calculation are in good agreement.

Keywords: Corrosion, inhibition, HCl, mild steel, quinoline, EIS, potentiodynamic polarization, gravimetric, DFT.

Oral Communications

Electrochemical processing of Materials

Comparative study of corrosion inhibition of *Artemisia herba alba*leaves aqueous extract on the corrosion of mild steel and aluminum in 1M HCl

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Abstract

Green inhibitors are an important way to decrease the corrosion rate of different industrial metals. The present work compares the anticorrosion behavior of both aluminum and mild steel that are considered as the most used in industrial world thanks to their important properties.*Artemisia herba alba*(AHA) aqueous extract is an ecofriendly inhibitor that has been added to 1M hydrochloric acid reduce its corrosive action on mild steel and aluminum. Hydrodistillation is the extraction method that has been used to prepare the aqueous extracts. The main method that has been used to evaluate this behavior is electrochemical impedance spectroscopy (EIS) measurement obtained by the potentiostat. The highest inhibition efficiency obtained is 90% for 1g/l of AHA leaves aqueous extract in 1M HCl concerning mild steel corrosion. The same ecofriendly inhibitor increases the rate of aluminum corrosion in hydrochloric acid.

Keywords: Corrosion, inhibitor, weight loss, EIS, potentiostat, hydrochloric, inhibition efficiency.

Poster Communications

Electrochemical processing of Materials

Synergistic Effect of an Hydrazone compound and potassium iodide on inhibition of corrosion of carbone steel in 1M HCl

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Abstract

L'emploi des inhibiteurs est une des méthodes les plus utilisées pour protéger les métaux contre la corrosion, en particulier en milieu acide.
Plusieurs travaux ont été réalisés au niveau de notre laboratoire de Chimie Analytique et Electrochimie (L.C.A.E) sur le pouvoir inhibiteur de la corrosion de l'acier en milieux acides par les composés organiques contenant de l'oxygène, l'azote et /ou le soufre. En revanche, les hydrazones - bases de Schiff- n'ayant pas de tout fait l'objet de l'étude de l'inhibition de la corrosion de l'acier en milieux corrosifs, ont été étudiés uniquement pour leurs propriétés électrochimiques, complexantes et biologiques.
C'est dans cette optique, que nous nous sommes intéressés à l'étude de l'influence du benzophenone hydrazone (BH), une première au laboratoire concernant la famille des hydrazones, sur le taux d'inhibition de la corrosion de l'acier au carbone XC38 dans HCl 1M. Pour réaliser cette étude, nous avons utilisé différentes techniques (gravimétrique et électrochimiques). L'ensemble des résultats montrent que l'inhibiteur étudié présente de faibles pourcentages d'inhibition de l'ordre de 34% pour une concentration de 10^{-3}M. Ce qui nous a emmené à l'étude de l'effet de synergie sur le taux d'inhibition du BH par l'addition de l'ion Iodure (I^-) sous forme de d'iodure de potassium (KI). Les résultats obtenus sont nettement satisfaisants avec un taux d'inhibition atteignant jusqu'à 86%.

Mots-clés: Inhibition, corrosion, acier XC38, Benzophenone hydrazone, Synergie.

Imidazolium grafting surface to perform oxygen reduction in lithium-air battery

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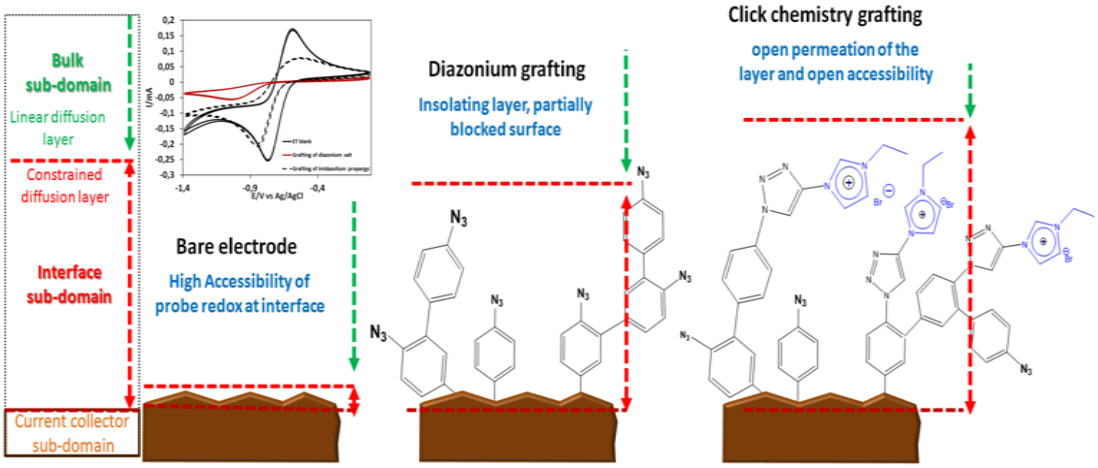
Abstract

Lithium-air batteries attract outstanding interest among energy storage devices due to their potentially significantly higher energy storage than current batteries. However many challenges remain to make it practical reality.[1] The main reaction during discharge is the reduction of oxygen. In fact, oxygen is first reduced to superoxide that reacts with lithium ions from the electrolyte to form lithium peroxide (Li_2O_2). This is similar to the formation of hydrogen peroxide in aqueous media but in this case, Li_2O_2 is a solid that is deposited on the electrode surface. Many challenges remain to understand its formation and reactivity which depend greatly on the chemical environment;[2] particularly (i) the solvent, (ii) the electrode porosity, (iii) the chemical nature of the electrode material, both in the bulk and on the surface.



Oxygen as inner sphere reactant has been widely studied in aqueous media on flat glassy carbon, gold or platinum. In this work O_2 reduction on new modified surfaces will be presented and discussed based on surface modification using imidazolium (see scheme). The grafting was obtained by two different strategies: (i) Grafting by click chemistry after a diazonium grafting or (ii) Diels-Alder addition directly on the surface of carbon. And using electrochemical data we can determine the coverage rate of the grafted surface and how this cationic layer impacts the electrochemical reactivity of oxygen.

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Highly sensitive and selective sensor for determination of profenofos based on MIP/GO/modified glassy carbon electrode

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Abstract

A novel and selective electrochemical sensor was successfully fabricated and used for the determination of profenofos (PFF) by drop coating of synthesized PFF molecularly imprinted polymers (MIP) on the surface of graphene oxide (GO) modified glassy carbon (GO/GC). MIP was synthesized using PFF as the template, methacrylic acid (MAA) and acrylamide (AM) as the functional monomers and ethylene glycol dimethacrylate (EGDMA) as the cross-linking agent in the presence of potassium persulphate as initiator.

The properties and structure of the MIP and NIP were characterized using Fourier transform infrared spectroscopy (FT-IR) and scanning electron microscopy (SEM).
Moreover, the MIP/GO/GCE was studied with respect to its response to $[Fe(CN)6]^{3-/4-}$ as a probe and characterized using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). This developed sensor showed a linear relationship, when using squar wave voltammetry (SWV), between peak current intensity (ΔI) and PFF concentration in the range 5×10^{-8} - 35×10^{-4} M. Furthermore, the limit of detection (LOD) and limit of quantification were found to be 5 nM and 16 nM, respectively. It is worth mentioning that, the designed sensor exhibited long-term stability, good repeatability and enhanced sensitivity towards PFF determination in real vegetable samples (cucumber and lettuce leaves) and waste water.

Keywords: Selected sensor, profenofos, caracterization

Oral Communications

Biomaterials in Sustainable Agriculture & Environment (agrochemicals, agro-materials)

Short- and Medium Term Impact of Conservation Agriculture on Organic Matter and Humic Acids of Soil

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Abstract

Soil organic matter (SOM) plays a crucial role in the functioning and development of terrestrial ecosystems and agro-ecosystems. Its increase is often considered beneficial while its loss leads to soil quality degradation. In Morocco, the adoption of inappropriate techniques, such as intensive tillage in semi-arid regions, leads to the depletion of soil in SOM. However, conservation agriculture, particularly no-till (NT) is proposed as an alternative solution limiting these losses in SOM contents. The methodology adopted in thios work was to monitor the levels of SOM in samples taken at different depths in two sites with two contrasting techniques (NT and CT) after 5, 8, 11, and 12 years of testing. In addition, we studied the effect of NT on AH after 8 and 12 year of the experiment.
The results obtained in this work have shown the favorable effects of the adoption of NT system in the time on these two important parameters (SOM and AH). At soil surface (0-10 cm), significant differences (P-value <0.05) were recorded for SOM under the NT system versus the CT after 8 (first site) and 12 years (second site) of testing. However, no significant differences (P-value > 0.05) were observed for layers below 10 cm deep. After 12 years of testing, the NT system significantly (P-value <0.05) improved the HA content in the layers above 20 cm deep compared to the CT.

Keywords : soil organic matter, humic acid, Vertisol, Morocco.

Comparative study of the insecticidal activity of the Pigment extracts of High Green Plants (*Spinaceaolearecea*)and Chlorophytaealgae (*Ulva Lactuca*) against fruit fly *Drosophila melanogaster*

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Abstract

The conventional chemical insecticide has been widely used in recent years and has led to many negative consequences on public health and the environment [1]. The fruit fly Drosophila melanogaster (Meigen 1830), considered a pest of sweet fruits, particularly citrus fruits have an economic impact on the production and storage of the fruits. The purpose of this study interest in finding alternative, environmentally friendly, cost-effective and non-toxic strategies as biocontrol. High plants and Macro algae are rich in bioactive molecules, they can substitute for dangerous chemicals pesticides [2].
Methods: The insecticidal activity of the pigment extracts of spinach leaves *Spinaciaoleracea* as well as the pigment of the green alga *Ulva Lactuca* were evaluated. The various pigments (chlorophyll a, chlorophyll b, carotenes and xanthophylls) were separated by the differential solubility method. Toxicity to fruit flies Drosophila melanogaster was determined by different insecticidal trials (*in vivo* spray application of oranges, ingestion toxicity, and repulsion activity) each of which has a specific insecticidal action pathway.
Concerning the toxicity to fruit flies, by spraying oranges, the chlorophyllian pigmentsextracts from *Spinaciaoleracea* spinach and the *Ulva Lactuca* seaweed, showed an interesting insecticidal activity, resulting in almost 100% mortality after 72 hours.

The chlorophyllian pigments extracted from green high plant (*Spinaciaoleracea*) or macroalgae (*Ulva Lactuca*) plants, could replace chemical insecticides by providing an alternative method of control against insect pests and especially the fly fruit Drosophila melanogaster. These natural products are respectful to the environment and public health.

Keywords: *Ulva Lactuca*, *Spinaciaoleracea*, Pigments, Insecticidal Activity, *Drosophila melanogaster*.

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Oral Communications

Valorization of Biomass, Bioremediation, phytoremediation

Evaluation of endocrine disrupting chemicals bioremediation and production of biomolecules by living cyanobacteria under estradiol stress condition

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Abstract

Application of microalgae for micropollutants has gained interest in recent years. In the present study, bioremediation of estradiol using living cyanobacteria, Phormidium versicolor, collected from Sfax solar saltern, Tunisia, has been investigated. Initially, the cyanobacterial strain was grown in BG11 medium at 25 °C, 60 μM m^2 s^{-1} irradiation in 14 h: 8 h light:dark cycle in an algal incubator. Samples were withdrawn after 2 days interval and analyzed for its dry biomass and lipid content. Optimum inoculum size of 10 % and age of 11 day were assessed based on maximum dry biomass (21.35 ± 0.04 g L^{-1}) and lipid (2.05 ± 0.02 g L^{-1}) production. FTIR study of both native and estradiol treated biomass were done to emphasize the changes. During kinetic study, initial estradiol concentration was varied in the range of 110–876 ng L^{-1}. Maximum estradiol removal (76.6 ± 0.11 %) and dry biomass (42.19 ± 0.12 g L^{-1}) were obtained at 110 ng L^{-1} estradiol concentration using 10 % of 11 th day's inoculum. Biomass and lipid content were found to increase 2 and 4 folds, respectively under estradiol stress condition. Furthermore, chlorophyll, carbohydrate and protein content of the biomass were also compared between control and estradiol contaminated conditions. Fatty Acid Methyl Ester (FAME) analysis was done using Gas Chromatography (GC) to compare the lipid profile of native and estradiol loaded strain.

Keywords: cyanobacteria, estradiol, bioremediation, lipid-content

Anti-adipogenic and lipolytic effect of Micromeria Barbata ethanolic extract on 3T3-L1 adipocytes.

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Abstract

Micromeria Barbata is an aromatic plant from Lamiaceae family previously found to possess potent in vitro anti-oxidant, anti-bacterial and anti-fungal activity which is mainly attributed to the high level of polyphenolic and flavonoids substances. Despite the known role of flavonoids in lipid metabolism, the role of *Micromeria* flavonoids in alleviating obesity have not been reported previously. Therefore, the main aim of this work is to reveal the cytotoxic effect of ethanolic extract from *Micromeria barbata* on 3T3-L1 cell line in vitro. We then investigate the anti-adipogenic and lipolytic effect of this plant using pre-adipocytes 3T3-L1 cells.
Ethanol extract of the *Micromeria barbata* was analyzed to determine its total flavonoid content (TFC) and total phenolic content (TPC). MTT and trypan blue viability assay was performed to determine the cytotoxicity of crude extract. 3T3-L1 cells were treated with different concentrations of ethanolic extract for 12 days starting 2 days post-confluence of differentiation. Lipid accumulation levels were determined using Oil red oil staining and glycerol content assay.

The TFC and TPC are almost high 31.95 mg quercetin/g extract and 89 mg gallic acid/g extract. Ethanolic extract did not show any cytotoxicity effect on 3T3-l1 up to 200µg/ml. Our results demonstrated that ethanolic extract significantly inhibited adipogenesis. All ethanolic treated cells had lower fat accumulation compared with control as shown by lower absorbance of Oil Red oil stain. Ethanolic extract at 50 and 100 µg/ml signficnatly reduce glycerol release after 6 hours to be 136 and 154% over control respectively.
Conclusion: The results suggest that this extract may be a potential novel therapeutic agent for the prevention and treatment of obesity.

Keywords: Micromeria Barbata, 3T3-L1, obesity, adipogenesis, cytotoxicity, crude extract, lipolysis

Oral Communications

Environmental Geochemistry
Hydrogeochemistry, AgroEnvironment

Environnemental Geochemistry and Agro Ressources Developement in SASS Aquifer Shared Between Tunisia, Algeria and Lybia

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Abstract

Le Système Aquifère du Sahara Septentrional (SASS), est un aquifère profond partagé entre l'Algérie, la Tunisie et la Libye. Le SASS désigne une superposition complexe de nappes dont deux principales couches aquifères sont logées dans deux formations géologiques différentes : le Continental Intercalaire (CI ou l'Albien) et le Complexe Terminal (CT).
La situation de surexploitation, confirmée par le modèle mis en place par le projet SASS de l'OSS, a exposé le SASS à des risques accrus de salinisation des eaux, de disparition de l'artésianisme, et de tarissement des exutoires.
Le projet SASS, qui a démarré en 1999, a atteint la troisième phase de sa mise en œuvre. Après avoir approfondi la connaissance de la ressource lors des phases précédentes (aspects hydrologiques et hydrogéologiques), cette troisième phase s'intéresse aux usages de l'eau (principalement agricoles) et, plus généralement, aux aspects socio-économiques et environnementaux liés aux pratiques d'irrigation dans le bassin.

Phase 1 du projet a notamment permis d'atteindre les résultats suivants:

- une bonne connaissance géologique et hydrologique du système aquifère ;
- la création d'une base de données recensant plus de 9000 forages ;
- un modèle mathématique permettant la réalisation de simulations et de prévisions.

Phase 2 du projet SASS a permis d'atteindre les objectifs suivants :

- la réalisation de deux sous modèles (Biskra et Bassin occidental en Algérie) et du modèle de la Djeffara tuniso-libyenne ;
- l'établissement d'un diagnostic sur les pratiques agricoles ;
- la mise en place d'un Mécanisme de Concertation au niveau institutionnel entre les trois pays dont l'unité de coordination est hébergée par l'OSS.

Phase 3 du projet SASS a permis d'atteindre les objectifs suivants :
La troisième phase du projet, intitulée « Recommandations opérationnelles pour une gestion durable de la ressource en eau du Système Aquifère du Sahara Septentrional (SASS)», a pour objectif l'identification et la proposition de Recommandations Opérationnelles visant l'amélioration de la gestion de cette ressource dans le sens de l'augmentation de l'efficience de son utilisation en irrigation dans le cadre de politiques de développement durable.

Keywords: SASS, Agro Ressources, Lybia, Algeria, Tunisia.

Investigation and Characterization of Algal Biomass Leathesia difformis and its Polysaccharide Fucoidan to discover its Biological Properties

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Abstract

The present project is clearly positioned in the biopharmaceutical field of extracts with high biological activity from brown seaweed is a priority. The marine environment is unfortunately not exploited so far in Lebanon. In order to investigate the biological potential of the brown alga Leathesia difformis from the Lebanese coast, this has never been studied before in this area, different tests will be performed. The aim of the research is to study different biological activities of the various extracts of abundant brown algae in North Lebanon and particularly Leathesia difformis. We will also investigate the activity of the sulphated polysaccharide, fucoidan, present in this alga.
L. difformis was collected in august from the Mediterranean sea of the Lebanese north coast. Extraction by maceration (sequential and crude) and soxhlet was done with different solvents of different polarities to obtain different extracts. Also, Fucoidan was extracted by the method of yang et al. [1]. Total phenolic content was analyzed using Folin–Ciocalteau reagent method [2]. The antioxidant activity was determined by DPPH radicals scavenging activity [3].Carotenoid and Chlorophylls were extracted by 80% acetone and then estimated [4]. Finally screening for antibacterial and antifungal activity was done by the method of diffusion in agar medium [5].
Polar extracts showed high phenolic content, fucoidan was found to have the highel phenolic content. The highest antioxidant activity was shown in soxhlet aqueous extract (94%) and fucoidan (89.67%). Soxhlet aqueous extract showed antibacterial activity against Pseudomonas aeruginosa (12mm), Crude extract of methanol also showed activity against all microorganisms tested except E coli, and Dichloromethane/methanol extract showed mild activity against some bacteria tested.
Conclusions: The highest phenolic content was found in more polar extracts, which correlates with the antioxidant activity, where the % inhibition of DPPH increased dose dependently as well as in soxhlet extracts. The significant antioxidant activity of the aqueous and fucoidan extracts and the moderate antibacterial activity of other extracts proves the importance of this algae to be more exploited and further studied.

Keywords: Leathesia difformis, Fucoidan, Antioxidant, Phenolic Content.

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Metabolic engineering of *Escherichia coli* for production of Hyaluronic acid

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Abstract

The large-scale production of biopolymers with innovative features are in the focus of research and industry. Hyaluronic acid (HA) is a polysaccharide found in the extracellular matrix of vertebrate epithelial, neural and connective tissues as well as in the extracellular capsule formed by some microorganisms. Despite the complexity of this polymer in structure and production, it is characterized by important features such as biocompatibility, viscoelasticity and high moisture retention which makes it an important component of major pharmaceutical, biomedical and cosmetic products with high commercial value worldwide. The world market doubled in the past years to approx. 1 billion USD. The main commercial sources of HA are animal tissues, particularly rooster combs, and bacteria (*Streptococci)*. However, these sources could be contaminated with endotoxins of animal or bacterial origin. Therefore, an alternative method has been considered by genetically engineering and induction strategy of endotoxin-free microoorganisms such as *Escherichia coli.* Our goal is to design a recombinant *E.coli* strain capable of producing novel hyaluronic acid with interesting industrial properties. The two recombinant *E.coli* strains have been successfully designed one expressing the traditional HASA gene that catalyze polymerization of hyaluronan from *Streptococcus zooepidemicus* and the other expressing a novel gene HAS-like om a hyperthermophilic archaea. These two strains are used during our work in order to characterize the recombinant biopolymer produced, optimize the production to be suitable for industrial applications and characterize the enzymatic properties of the Has-like enzyme after column purification. Preliminary results showed that both strains produce a polyanionic polymer whose chemical structure needs to be further characterized its physical-chemical properties determined. Furthermore, the kinetics of enzymatic activity of the recombinant His-tagged HAS of both strains will be measured after purification on NICKEL-chelating RESIN.

Keywords: Hyaluronic acid, STREPTOCOCCUS, Microbial production, hyperthermophilic archaea, *Escherichia coli*, recombinant strain.

Poster Communications

Environmental geochemistry
Hydrogeochemistry, AgroEnvironment

Quantitative study of Ground Water Area of El-Hdaeik Wilaya Skikda (N-E Algeria)

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Abstract

In Algeria, groundwater constitutes a large part of the hydraulic heritage of the country, due to relatively easy exploitation. The need for water use takes a more growing, because the possession of pure water for human needs, industry and agriculture is an essential factor of civilization, it is also a natural resource essential to the continuity of life and development. Water requirements in the plain of El-Hadaiek has agricultural vocation par excellence, has helped to hang conscience of capital role of water in agricultural development and the mobilization and rational use of resources hydraulic, stakes and essential concern of the century to come. In the study area, groundwater is the main water resource. The objective of our work is to see an idea about the quality of groundwater in the plain of El-Hadaeik Skikda, the results of chemical analyzes show that the water having a good quality to admissible for irrigation.

Keywords: SKIKDA; El-Hadaiek plain, Quality, Groundwater, Irrigation

Comparative Study of Municipal Solid Waste treatment for the city of Tripoli, Lebanon

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Abstract

Selon la Banque mondiale, l'activité de l'espèce humaine génère entre 3 et 4 milliards de tonnes de déchets par an dans le monde. Au Liban, la quantité de déchets augmente de facon progressive, chaque habitant produit en moyenne 1,1 kg de déchets ménagers et assimilés par jour. La gestion inefficace des déchets municipaux solides a conduit malheursement à une gigantesque déchetterie qui contamine de facon spectaculaire le sol par les lixiviats, l'air par le gaz dégagé ainsi l'eau de mer.
La nature de déchets est variée : 52% organique, 37% recyclable et entre 8% et 15% des déchets solides seulement sont recyclés et compostés respectivement. Dans cette étude on s'interesse à etudier les différentes methodes de traitement : l'incinération, la methanisation et la pyro-gazeification.
Un calcul de la puissance électrique et thermique est alors menée, puis les avantages et les inconvénients sont alors présentée pour mener une comparaison entre les différentes méthodes et choisir la plus adequate pour quelle soit appliquée à la déchetterie de Tripoli.
Premièrement, l'application de la méthanisation sur les déchets pour l'année 2017 a générée 20 MW de puissance thermique, 5 MW de puissance électrique. Deuxièmement, l'application de l'incinération a générée 31 MW de puissance thermique, 7 MW de puissance électrique. Finalement, l'application de plasma a générée 48 MW de puissance thermique, 13.5 MW de puissance électrique.
Le calcul montre alors que la valorisation des déchets par Pyro-gazeification est bien meilleur par rapport aux autres methodes. En outre, les produits obtenus par cette method de traitement sont sous forme de composés énergétiques qui gardent tout leur pouvoir énergétique pour une application spécifique ultérieure.

Mots clés: valorization, traitement, incineration, methanisation, pyro-gazeification, déchets menagers, Tripoli

L'enrichissement en nutriment et risque d''eutrophisation des eaux de l'Oued Kebir (Skikda Algérie)

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Abstract

Les apports dus aux rejets direct des effluents domestiques et agricoles perturbent les équilibres des eaux de surfaces, causant une introduction massive des nutriments notamment azote et phosphate d'où la manifestation d'une eutrophisation des cours d'eau qui se traduit par un développement excessif d'algues et un appauvrissement de l'eau en oxygène.

Ce travail présente l'état et l'évolution des niveaux de concentration des principaux polluants détectés dans les eaux du bassin versant de l'oued Kebir Ouest l'un des bassins du côtier Constantinois centre L'évolution des concentrations a été suivie dans 08 sites d'échantillonnage prélevés tout le long de l'oued principal et ses affluents durant le mois de Mai 2014, le choix des sites de prélèvement est justifié par la présence de points susceptibles d'engendrer une pollution (eau usées urbaine, agricole ou industrielle).

Les rejets d'eaux usées et les pratiques excessive et incontrôlées des engrais dans le bassin d'étude ont eu un impact assez important sur les eaux de surface de la majeure partie de l'oued Kebir Ouest et ses affluents par une eutrophisation plus ou moins importante à quelques endroits. Le principal impact de ce phénomène est la détérioration de la qualité générale de l'eau de surface qui nécessitera des traitements avant toutes utilisations et un control des rejets d'eau usées dans ces milieux.

Mots clés : nutriments, eutrophisation, oued, eau usée, pollution

Oral Communications

Bio/Electrochemistry
& Environmental applications

Phytobac and electrocoagulation: two practical management tools for pesticides wastewaters.

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Abstract

The disposal of pesticide-containing waste is a problem of worldwide concern. With almost every stage of pesticide used involving the formation of wastes [1], that contains substances that are strictly controlled by regulatory bodies. The presence of large stocks of pesticides that are unusable, either due to the fact that they are banned or have expired, is of great concern especially, in developing countries [2]. Various methods for pesticide treatment are available, according to the World Health Organisation which include high temperature incineration, chemical treatment or removal to specially engineered landfill sites [2].
This work provides new results on the electrocoagulation and phytobac degradation of pesticide and lead to the following conclusion such as, after 1 year, the pesticide residue in the pytobac is lower at limit of quantification (LOQ). For all pesticide studied by electrocoagulation the removal of pesticide wastewater is between 95 to 98

Keywords*:* Pesticide wastewaters; Phytobac; Electrocoagulation

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Removal of Selected Pharmaceuticals from Aqueous Solutions Using Heterogeneous Photocatalysis

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Abstract

Pharmaceutical compounds (PhCs) in general characterized by their low biodegradability and high chemical stability, making conventional treatment technologies incapable to eliminate such kinds of recalcitrant compounds. In the current study, removal of two non-steroidal anti-inflammatory drugs (NSAID) from aqueous phase has been investigated through employing photolysis and heterogeneous photocatalysis processes.

Mefenamic acid (MEF) and diclofenac sodium (DCF) are commonly used as analgesic and inflammatory drugs and they are widely present in sewage systems. In this study, experements were divided into two parts: Photolysis and heterogeneous photocatalysis. Concerning photocatalysis experiments, TiO_2 as a catalyst has been used in two forms: (i) as dispersed powder; (ii) immobilized on the surface of blue slabs. Obtained results showed that photolysis had low efficacy toward degradation of MEF (half-life ($t_{1/2}$) 1442 min). While, using TiO_2 as dispersed powder during the photocatalytic process enhanced the process dramatically and reduced half-life ($t_{1/2}$) to 90 min, furthermore, it is possible to reach the complete mineralization after approximately 3 hours, whereas addition of TiO_2 through immobilized system led to a little improvement in the photodegradation process behavior ($t_{1/2}$ =1140 min.). For DCF photocatalysis by using TiO_2 dispersed powder shows the fastest extent of degradation with 54.6 min of half-life ($t_{1/2}$), while direct photolysis and photocatalysis using TiO_2 immobilized system showed approximately comparable results (71 and 79 min respectively).

Kinetic studies for both drugs were accomplished and photoproducts were identified using liquid chromatography coupled with mass spectrometry system (LC-MS).

The overall results suggested that using heterogeneous photocatalysis with TiO_2 dispersed powder accelerate degradation process than TiO_2 immobilized system. In spite of this, using TiO_2 supported on glass substrates appears to be a promising alternative to conventional TiO_2 suspension, since it is able to provide a clean method through saving a post treatment stage for recovering the catalyzer powder.

Keywords: Diclofenace sodium, mefenamic acid, TiO_2, photocatalysis.

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Electrochemical treatment of phenol in brine water using aplate-and-frameGDE/BDD reactor – A pilot plant study

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Abstract

Electrochemical advanced oxidation processes (EAOPs) have been recently considered in literature as highly efficient 'clean technologies' for the degradation of recalcitrant organic pollutants in potable water and industrial wastewater [1]. The most popular EAOPs are anodic oxidation (AO) and electro-Fenton (EF), the oxidation power of which can be utilized for the effective treatment of heavily polluted brine solutions, such as wastes generated during the hydraulic fracturing of shale reservoirs for the extraction of oil and/or gas [2]. This paper investigates the electrochemical oxidation of phenol in brine water (TDS of 4000 mg/L)by the coupling of AO and the cathodic EFreaction between in situ electrogenerated hydrogen peroxide and ferrous ions towards the production of strong oxidants, like hydroxyl radicals (•OH). The experimental work was carried out at pilot scale, in batch recirculation mode, with an undivided plate-and-frame cell equipped with a boron doped diamond (BDD) anode and a carbon-PTFE (gas diffusion electrode, GDE) cathode, of 0.01 m^2 effective area each. The effect of operatingconditions, such as electrical current, pH, air flow rate, feed flow rate and Fe(II) dosage, on the phenol degradation rate, current efficiencyand energy costs was investigated. During the various stages ofelectrolysis, parameters such as pH, conductivity, temperature and redoxwere monitored and recorded via a supervisory control and data acquisition (SCADA) system. Untreated and treated brine samples were tested for phenol and COD levels. TheUV–vis spectra of the collcetd samples were also studies. Due to the strong oxidizingpotential of the chemicals produced [BDD(•OH), •OH, Cl_2, OCl^-], phenol was effectively oxidized until its total mineralization. The degradation rate and mineralization efficiencyincreased with applied current and pH. The new results highlight the potential of the AO-EF remediation technique for treating organics in concentrated brines, such as produced water.

Keywords: BDD anodic oxidation, GDE cathode, electro-Fenton, phenol, brine solutions

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Le traitement des eaux usées urbain par la technique de l'électrocoagulation-floculation

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Abstract

Dans ce travail nous nous focalisons sur le traitement des eaux usées urbain par un nouveau procédé intitulé ''l'électrocoagulation-floculation (ECF)'' pour l'élimination de la demande chimique en oxygène (DCO), la demande biochimique en oxygène (DBO_5), les matières en suspension (MES), les nitrates (NO_3), l'azote total (N), le phosphore (P) et les coliformes fécaux (CF). L'effet de l'ajout d'un floculant naturel extrait de matériel végétal, le jus d'Opuntia Ficus Indica (OFIJ), au procédé de l'électrocoagulation à était réalisé. En outre, l'effet de plusieurs paramètres opérationnels tels que: la densité de courant, le temps de réaction, la dose de floculant, la quantité spécifique d'électrodes dissoutes et pH initial, sur l'élimination des principaux polluants a été déterminée. L'application du procédé ECF dans des conditions optimales telles que: la densité de courant (200A/m2), le temps de réaction (30min), la dose de floculant (6ml/L), le pH initial (7.4) et une quantité spécifique d'électrodes dissoutes (0.2 kg/m^3) permet d'atteindre un taux d'élimination de :85% pour la DCO, 84% pour DBO_5, 94% pour MES, 63% pour N, 73% pour NO_3 et 99% pour P. De plus, il est intéressant de noter qu'une durée de 10 min est suffisante pour éliminer 99% de coliformes fécaux (CF). Une analyse comparative des coûts d'exploitation a également été effectuée et il a été constaté que le cout relatif à l'élimination de la DCO et le P, par la nouvelle technique l'ECF nécessite 0,7 $ / Kg de DCO et 0,3 $ / kg de P contre 0,9 $ / kg DCO et 0,35 $ / kg P pour le procédé de l'EC.

Mots-Clés : Eaux usées urbaines; L'électrocoagulation (EC); Électrocoagulation-floculation (ECF); Jus d'Opuntia Ficus Indica (OFIJ).