The 3rd African Conference on Research in Chemistry Education

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"SHOULD EDUCATION ABOUT CHEMICAL WEAPON'S BE MORE MAINSTREAM?"

Prof. Alastair HAY, PhD, OBE

Emeritus Professor of Environmental Toxicology, Leeds University, Great Britain

ABSTRACT

Those involved in arms control issues call for more education and outreach activities to promote the aims of international treaties governing weapons systems. This is true for all treaties be they concerned with chemical, biological, nuclear or other radiological weapons. The call for more education has been made largely by those in foreign and defence ministries with hardly any involvement by education ministries. As a result activity on the education front has been limited and local. If outreach activities are to become more widespread and effective a number of questions need addressing. What needs to be said, to whom, and why? What is the evidence that the messages will be effective in achieving the desired goals which, by and large, are the non-use of these indiscriminate weapons? Should everyone be taught about the issues even if they will never use the weapons? Should we treat the education about weapons much as we might the need to wash hands to prevent infections, or the need to learn about managing money to avoid getting into debt? But are the risks the same? Most people are at risk of infections and debt is widespread. Why does this work if the majority of states have got rid of their chemical weapons, for example? Is the odd rogue scientist who might be tempted to make a chemical weapon worth all this trouble? Or is the issue about civilian support for international regimes that police industry what we are after? Why is industry the threat? These and other questions will be explored in this presentation.'

'IMPACT OF NANOTECHNOLOGY ON HIGHER EDUCATION CURRICULA: CASES OF "CHEMISTRY 'AND "CHEMICAL ENGINEERING" CURRICULA'

Pr. Djafer BENACHOUR

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ABSTRACT

The very fast and large development of nanotechnology over the last three decades, has led to:
1. The introduction of new concepts that have to be mastered and taken into consideration: "green chemistry"; "sustainable development"; " nanotechnologies" and "nanosciences", "convergence of sciences"...
2. The emergence of new techniques and technologies in chemical synthesis. For example, the production of a new type of catalysts that are much more efficient: **nanocatalysts**: this new type of catalysts, combined to **microreactor technology**, were behind the mutation of catalysis, from art to science. Many synthesis reactions are now performed with a 100% yield and with no side products...
3. The production of **nanomaterials** that are now being used in different fields. These nanomaterials spread out to many scientific and technologic fields, notably in materials science, in catalysis and in medicine. For instance, smart nanocarriers for drugs delivery and targeting, ranging from liposomes, to polymeric nanospheres and micelles, are now used for cancer treatment. These drugs nanocarriers helped the emergence of what is now called "**Nanomedicine**".
These scientific and technological developments are having a strong impact, not only on chemical industries and chemicals production... but also on chemistry and chemistry related education curricula and research activities at different levels. This impact is clearly seen over the comparison of higher education curricula evolution of major disciplinary fields such as chemistry, chemical engineering, biology, materials science...
As illustration of such an impact, the evolution of curricula from different leading higher education institutions is followed over the last three decades. It is observed that:
- Nanotechnology related topics increased regularly, going from "discovery and optional" courses in the 1980's to "major and fundamental" teachings in this beginning of the XXIst century. For instance, polymer nanocomposites are now industrially produced and their teachings have become an important part in materials/polymer science curricula.
- Atomic force microscopy, a powerful and unavoidable technique for surface characterization at the nanoscale level, is now available in most research laboratories.
- Chemistry curricula are containing more and more biology contents while biology curricula are containing more and more chemistry contents.
- Chemical engineering" and "biology engineering" are merging into a single field called "Biochemical engineering" ...

'IMPLEMENTING THE RESPONSIBLE USE OF CHEMISTRY IN THE CURRICULUM'

Pr. Alejandra G. **SUÁREZ**

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ABSTRACT

Thousands of new chemicals are reported every day which can render enormous benefits for the common good. However, new developments in science and technology are paving the way for a multitude of opportunities beneficial to humankind could also open the door to unforeseen challenges and abuses. Many chemists have limited or no exposure to the ethical norms and to the aims of the Chemical Weapons Convention during their careers. The availability of information and materials makes evident that awareness-raising about the multiple uses of chemical substances and the dual use nature of scientific knowledge is an urgent need, in particular in the field of chemical education.
This work will refer to our initiatives focused on the consideration of issues of ethics, responsibility and the CWC in the chemistry curriculum at all levels of education and public outreach programs. The presentation will also describe our experience to include these topics in the core curriculum, elective courses and complementary activities at university for the degree in chemistry.

'IRRESISTIBLE CONTEXT ORIENTED CHEMISTRY'

Pr. Jan **APOTHEKER**

Emeritus Professor, University of Groningen (The Netherlands)

ABSTRACT

In the project Irresistible (Apotheker et al., 2016) 14 partners have worked together to raise awareness to Responsible Research and Innovation through Inquiry Based Science Education. Universities worked together with Science Centers and Schools. Within the Universities the departments of (chemical or science) education were involved as well as research institutes that do science research.
In the 10 countries participating in this project 'Community of Learners'(CoL) were formed in which researchers, teachers, educational specialists and specialists in informal learning from science centers work together. If possible specialists from industry were added to the CoL. In this first round the aim is to have at least five schools represented in the CoL.
The partners in the project IRRESISTIBLE have designed 17 modules for students to:
Increase content knowledge about research by bringing topics of cutting edge research into the program
Foster a discussion among the students about RRI issues about the topics that are introduced.
In the modules the science content is presented with a context as the leading start. The context is needed in order to capture the attention of the students and increase their motivation to work on the project. It makes the science content relevant to them. The context also sets the stage for the learning process.
In the module from Israel, titled 'the RRI of Perovskite-based Photovoltaic Cells' (Blonder et al., 2016) for example the students in a ninth grade class are asked to find arguments pro and contra the installation of solar energy in the windows of their school. After learning the science needed to understand the working of these solar cells in a science center, they come back to school to study about energy transition. In the end they build exhibits to inform the other stakeholders in the school about the aspects playing a role in the decision about solar panels.
Contexts are a powerful tool in motivating students to learn about science in general and chemistry in particular.

References

Apotheker, J. H., Blonder, R., Akaygun, S., Reis, P., Kampschulte, L., &Laherto, A. (2016). Responsible research and innovation in secondary school science classrooms: Experiences from the project irresistible. Pure and Apllied Chemistry, 88(December), online.
Blonder, R., Rosenfeld, S., Barad, R., Bar-Dov, Z., Khatib, F., Rap, S., et al. (2016). The RRI of perovskite-based photovoltaic cells. Rehovot, Israel: the Weizmann Institute (http://www.irresistible-project.eu/index.php/en/resources/teaching-modules)
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'MAKING SCIENCE ACCESSIBLE, HOW TO TEACH CHEMISTRY TO VISUALLY IMPAIRED STUDENTS'

Pr. Mustafa **SÖZBİLİR**

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ABSTRACT

Chemistry is the science of matter and its transformations. Matter, from the chemical point of view, consists of the substances we encounter in our daily lives, such as solids, liquids, and gases, as well as the atoms and molecules of which these substances are composed (American Chemical Society [ACS], 2012). Therefore, teaching chemistry requires the understanding of interaction taking place at micro level in the systems we encounter in everyday lives. Another major aspect of chemistry instruction is the communication system which helps to transfer message between the chemists. This necessitates the symbolic level. The mission of chemistry education, in terms of school establishments, is to prepare individuals who would develop a certain level of scientific understanding and basic scientific process skills necessitates to understand the interactions in chemical phenomena at macro, micro and symbolic level.

Learning chemistry requires intensive use of our senses, particularly eyes to be a good observer. However, some of the individuals, have difficulty in using their eyes due to visual impairments. Although there are different definitions, visual impairment is used as an overall term that encompasses all people with decreased vision, regardless of the severity of their vision loss. In terms of educational purposes, the visual impairment is used to describe children whose visual condition in such that special provisions are necessary for their successful education. In this presentation, visually impaired students' needs in carrying our laboratory works and learning chemistry will be discussed. In addition, samples from learning materials which was developed to meet those students' needs will be presented. Recommendations will be made how to adapt chemistry content to visually impaired students.

References

American Chemical Society (2012).ACS guidelines and recommendations for the teaching of high school chemistry.
Retrievedfromhttps://www.acs.org/content/dam/acsorg/education/policies/ recommendations-for-the-teaching-of-high-school-chemistry.pdfon January 5, 2017.

"SYSTEMS THINKING, SUSTAINABILITY, AND SECURITY, A ROLE FOR CHEMISTRY EDUCATION"

Pr. Peter **MAHAFFY**

King's University in Edmonton, Alberta, Canada

ABSTRACT

Chemistry plays a crucial role in making modern life possible. Yet the scale of the chemistry carried out by 7.4 billion people has both beneficial and destructive impacts on our planet and its people. The eyes of the world are drawn to the fact that human activity and chemical reactivity are inextricably intertwined, as many of the control variables for our planetary boundaries that are entering or moved beyond zones of uncertainty are quantified by fundamental chemistry measurements. Analysis shows that planetary boundaries under particular threat from human activity include those related to the amount of fixed nitrogen, the phosphorus cycle, ocean acidification, and climate change. And biophysical changes, such as those due to changing local climates, are projected to lead to substantially amplified rates of human conflict in the coming decades.

What kind of chemistry education is appropriate to prepare students for life in a world with little certainty, except that it will be more complex and uncertain than today's world? Unfortunately, formal chemistry education often introduces concepts in isolation from important integrating contexts, and misses rich opportunities to apply systems thinking in which the powerful tools of chemistry can help to achieve a more sustainable and secure planet. We will explore approaches and curricular resources that can be used by chemists and others in educating for complexity, uncertainty and sustainability on a changing planet.

'TWENTY YEARS ON SATLC SYSTEMIC CHEMICAL EDUCATION REFORM IN THE GLOBAL AGE'

Pr. Ameen F. M. **FAHMY**

Emeritus Professor, Ain Shams University, Abbasia, Cairo, Egypt

ABSTRACT

The Systemic Approach to Teaching and Learning contribution to chemical education reform [SATLC] was initiated about 20 years ago when it became clear that the globalization of most human activities had begun. Our interest in science education led us to the belief that it must reflect a flexibility to adapt to rapidly changing global needs. We needed a paradigm that would respond rapidly to the global needs, as well as providing our students with a way to shift their learning habits from a linear approach [LA] to a systemic approach [SA].

SATL is a new way of teaching and learning, based on the global idea that nowadays everything is related to everything. Students shouldn't learn isolated facts (by heart), but they should be able to connect concepts and facts in an internally logical context.

SATL represents a theme and method of teaching and learning that finds use in all aspects of the modern human condition and the challenges. It helps learners to achieve a deeper learning experience, improve their understanding, enhance a systemic way of thinking, and increase their enthusiasm for learning chemistry, as well as other subjects. It leads to a systemic change in the educational process.

We have conducted numerous experiments in which we attempted to establish the effectiveness of SATL methods not only in chemistry, but also in other basic sciences, medicinal sciences, engineering sciences, and linguistics. In chemistry, our SATLC efforts have addressed the pre-university, and university levels of education. We have created SATLC units on general, analytical, aliphatic, aromatic, and heterocyclic chemistry. In this presentation, various examples of systemic teaching materials will be illustrated.

References:

[1] Fahmy, A. F. M., Lagowski, J. J., The Use of Systemic Approach in Teaching and Learning for 21st Century, J Pure Appl. 1999, [15th ICCE, Cairo, August 1998].

[2] Fahmy, A. F. M., Lagowski, J. J., Systemic Reform in Chemical Education: An International Perspective, J. Chem. Edu. 2003, 80(9), 1078.

[3] Fahmy, A. F. M., Lagowski, J. J., Systemic Multiple Choice Questions (SMCQs) in Chemistry [19th ICCE, Seoul, South Korea, 12-17 August 2006].

[4] Fahmy, A.F.M.,SATLC applications as examples for systemic chemistry education reform in the global age, AJCE, 2014, 4(2),2-30 Special Issue (Part I)[Presented ACRICE-1, Addis Ababa, Ethiopia DEC.2013]

[5] Shazia Summer, AnamShafi and Iftikhar Imam Naqvi, SATL model lesson for teaching effect of temperature on rate of reaction, AJCE, 2014, 4(2),139-144, Special Issue (Part I)[Presented ACRICE-1, Addis Ababa, Ethiopia DEC.2013].

[6] Bradley,J, The chemist,s triangle and general systemic approach to teaching and learning and research in chemistry education , AJCE, 2014, 4(2),64-79 Special Issue (Part I)[Presented ACRICE-1, Addis Ababa, Ethiopia Dec 2013]

[7] Fahmy,A.F.M. Uses of systemic approach and chemist's triangle in teaching and learning chemistry: Systemic Chemistry Triangle [SCT] as a teaching & learning strategy, AJCE, 6[2], 69-95,July2016.

INVITED CONFERENCES

"NANO AND MICROMECHANICS OF POLYMERS AND NANOCOMPOSITES RELATING TO NANOSTRUCTURE"

Pr. Francisco José BALTÁ-CALLEJA

Emeritus Professor at the « Instituto de Estructura de la Materia », C.S.I.C., Serrano 119, Madrid 28006, Spain.

Abstract

The main concern of this presentation is to offer an overview of results concerning the nano-structural characterization of polymers and composites by means of microindentation hardness. Indentation with a sharp indenter, involving deformation on a very small scale, is one of the simplest ways to measure the mechanical properties of a material. The basic aspects of the microindentation mechanisms will be first introduced and the correlation between microhardness and yield stress will be highlighted. The relationship between microhardness and nanostructural parameters is discussed and models of plastic deformation to predict the microhardness of lamellar polymer crystals will be reviewed. Several examples illustrating the microhardness enhancement of semicrystalline polymers by means of micro-additives (fullerenes, carbon fibres, graphene, layered silicates) will be highlighted. In particular, the influence of filler structure and particle size on the microhardness of carbon black/polymer composites will be discussed. Earlier studies on the nanostructure and micromechanical properties of polyethylene/fullerene composites will be recalled. Finally, the microhardness-nanostructure correlation in case of poly(butylene terephthalate) nano-composites with single- and multi-walled carbon nanotubes will be emphasized, including the dependence of the creep constant on the carbon nanotube content.

'SOFT CHEMICAL SYNTHESIS OF NANOSTRUCTURED MATERIALS'

Pr. Mustapha **AIT ALI**

Université Cadi Ayyad, Marrakech, 40001, Morocco

ABSTRACT

Nanostructured materials may be defined as materials whose structural elements - clusters, crystallites or molecules- have dimensions in the 1 to 100 nm range. As compared to bulk materials, nanoscale materials exhibit large surface areas and size-dependent quantum confinement effects. They often have distinct electronic, optical, magnetic, chemical, and thermal properties

One of the important goals for nanoscale synthesis is the production of structures that achieved monodispersity, stability, and crystallinity with predictable morphology. Nowadays, the solution-phase approach has become a promising technique to prepare nanostructures. During the solution-phase synthesis of nanoparticles, the control of nucleation and successive growth, which is extremely sensitive to the synthetic parameters, has been believed to be the key to the size and shape-controlled synthesis of nanostructures.

In principle we can classify the wet chemical synthesis of nanomaterials into two broad groups:

The top down method: where single crystals are etched in an aqueous solution for producing nanomaterials.

The bottom up method: consisting of precipitation method, sol-gel etc. where materials containing the desired precursors are mixed in a controlled fashion to form a colloidal solution.

The current work is devoted to the synthesis of nanostructured CuO, Cu2O, ZnO and Silicon (nanoparticles and nanosheets) with high specific surface area using a fast, facile and inexpensive solution method which should be suitable for large-scale production.

Bottom up method was applied to prepare nanostructured CuO, Cu2O and ZnO powders at room temperature from metallic copper powder, zinc powder, and other precursors in the presence of directing agent such as ethylene glycol, sodium dodecyl Sulphate (SDS)...

Using top-down solution processes, one pot synthesis of silicon nanoparticle and silicon sheets in gram-scale quantities by Redox-Assisted Chemical Exfoliation (RACE) of calcium disilicide (CaSi2) from materials including a 2D sheet structure as a fundamental unit was reported. Among many Zintlsilicides, only calcium disilicide (CaSi2) has a structure that includes 2D silicon puckered sheets in which the Si6 rings are interconnected. The puckered $(Si–)_n$ polyanion layers are separated from each other by planar monolayers of Ca2+.

All the prepared nanoparticles were characterized by X-ray diffraction measurements (XRD), Fourier Transform Infrared Spectroscopy (FT-IR), scanning electron microscopy (SEM) and Nitrogen adsorption (BET).

'CHEMICAL SAFETY AND SECURITY MANAGEMENT: ROLE OF THE OPCW '

Dr. Rohan P. **PERERA**

Senior International Cooperation Officer
International Cooperation Officer Branch
Organisation for Prohibition of Chemical Weapons OPCW, The Hague (The Netherlands)

ABSTRACT

The rapid advances of sharing information and communication technology in recent years has seen knowledge management become a key tool for the success of an organization. Many international organizations have developed various programs and activities on chemical risk management and mitigation practices to prevent chemical accidents and potential misuse of chemicals which plays a pivotal role as key to their future expansion strategies. The OPCW has identified knowledge and information sharing as one of their primary management tools to overcome current threats posed by non-State actors on chemical facilities.

The result is the rapid expansion of information sharing and knowledge dissemination activities among Member States specifically targeting government and private sector officials who track and oversee the legitimate uses of chemicals of interest. Despite the increasing popularity amongst the scientific and non-scientific community, sharing information and knowledge dissemination related to risk assessment and management strategies, during workshops and seminars remain a complex and challenging task. It creates specific challenges as States Parties have adopted different risk management strategies to cater to their individual needs in diverse cultural settings.

It has been evident that valuable resources have either been underutilized or duplicated, in the pursuit of developing better safety and security assessment tools. Therefore, adhering to a common integrated safety and security risk management plan would enable a common solution to overcome national boundaries across diverse cultural settings. This seminar attempted to explicate the importance of a common safety and security risk assessment tool, which is accepted by Member States. This seminar attempted to explicate the importance of a common safety and security risk assessment tool, which is accepted by Member States. The outcome of this forum illustrated the need to provide systematic processes to understand the risk related to chemical industries. In a future forum, the objectives of the safety and security risk assessment programs would be accomplished through sharing of case studies, table top exercises and group discussions. It could explicitly defines the roles and responsibilities of professional risk management teams, and identify results which could be leveraged for proper understanding of risk based safety and security assessment for Member States.

"CHEMISTRY RESEARCH IN ALGERIA: A REVIEW OVER THE PAST TWENTY YEARS"

Pr. Hafid **AOURAG**

Directeur Général, Direction Générale de la Recherche Scientifique et du Développement Technologique (DGRSDT), El Madania, Alger.

Abstract

An overview of the chemistry research over the past twenty years will be presented through the activities of the different research laboratories (universities as well as research centers) involved.

'CHEMICAL ENGINEERING AT THE UNIVERSITY OF SETIF: A TRIBUTE TO THE MEMORY OF PROFESSOR BRAHIM DJELOULI'

Pr. Farouk TEDJAR,

Laboratoire d'Electrochimie et de Physico-chimie des Matériaux et des Interfaces (UMR 5279), I.N.P.G., Grenoble, FRANCE.

ABSTRACT

When the Chemical Department was first opened in 1981, Brahim DJELLOULI was among the very first teachers who joined the Department. He had just been freshly graduated, as a young engineer, from the Polytechnic National School of Algiers.
There was only an Electrochemistry group present at that time. He was the first who introduced the Process Engineering to the department and thus became "Mister non electrochemistry courses". He was always volunteering to give new courses and setting up very smart practical experiments despite the poor availability of the equipments at that time.
His thirst for knowledge and the need to go further in scientific understanding prompted him very quickly to apply for a grant to pursue Ph.D. studies. He was granted the financial support and joined the Louis Pasteur University of Strasbourg in France. He began working on the very early stage of HDS at very high pressure. I had the honour and privilege of being a member of his PhD thesis jury where I discovered how interesting his thesis subject was. His Ph.D. results were largely used by members of the research team he was working with and led to the publication of many papers. Some industrial companies including Elf (currently TOTAL), ARKEMA, BP and SHELL were also interested in his results. He declined a proposal for a research position made by the management of the Laboratory shortly after he submitted his PhD.
I was told that this offer was made to him not only because of his skill and expertise but also for his Human Qualities. Indeed, during all the years we worked together, I appreciated his Generosity, Humility and Readiness to share with others. He always seemed to have a permanent smile on his face.

After he finished his Ph.D. studies, he came back to resume his work at the Ferhat Abbas University of Setif in Algeria. He set up a research team which continued to work on his Ph.D. thesis results. He then went on to create the Laboratory of Chemical Process Engineering and became its Head until he left us on the morning of December 1st, 2014. Brahim died of a sudden and fatal heart stroke, while he was on his way to the university ...

HIS WORK ON HDS

Some words on the importance of the segment of the PhD works of Brahim DJELLOULI carried out before 1990. He was almost the first to realize experiment under such high pressure. He combined his talent of scientific but also engineer as he designed and constructed original high pressure reactor!
Success of HDS's works and several European has contributed to a deep changes in sulfur emission regulations that have decreased successively from 500 to 50 ppm between 1998 and 2005, reaching finally 10 ppm since the 1st January 2009 (European standards).

"APPLICATIONS OF ELECTROCHEMISTRY IN EVERYDAY LIFE"

Pr. Larbi ZERROUAL

Département de génie des procédés, Université Ferhat ABBAS Sétif-1, Sétif, Algérie,

Abstract

A general definition of electrochemistry would be: Electrochemistry is the science that studies the properties and chemical transformations of/within ionic conductors (most commonly a solution of a salt) and at the interface between an ionic conductor and an electronic conductor (most commonly a metal) or semiconductor. In this definition, two broad and well differentiated areas can be distinguished, depending on the number of phases present in the system. First, the study of ionic conductors constitutes the subject of one part of electrochemistry called ionics. In this case, all charged species are located in a single phase. When charged species can circulate between phases (for instance, a metal and an electrolytic solution), new concepts become relevant, such as the electric potential of the phase and the potential difference between phases. This is the subject of the part of electrochemistry called electrodics. This includes the study of the thermodynamic properties of the interface and the relation between the different parameters (concentrations, potential difference, temperature, pressure…) that govern the rate of electron transfer through the interface. In the present work, we present a brief description of the most useful applications of electrochemistry in everyday life.

"CHEMISTRY IN US AND FOR US"

Pr. Abdelkrim GOUASMIA
Mohamed-Cherif MESSAIDIA University, Souk Ahras, Algeria

Abstract

Chemistry is often called "central science." It leads us to the heart of matter to better understand and discover what atoms are? How do they get together to give molecules? And by what types of reactions do they build the world and living matter?

Chemistry is an incredibly fascinating field of study. It tells us about the chemical nature of the objects that come alongside us. Organic chemistry is one of chemistry's discipline. It is fundamental to our world; it plays a part in the lives of all and touches, in one way or another, almost every aspect of our existence. Even the human, animated by life and intelligence, is composed of living matter made up of chemical elements and molecules. These chemical entities are involved in the cellular functioning of our organism, they affect all aspects and segments of our society, they respond to our basic needs and contribute greatly to the improvement of well-being in our daily lives. Without chemistry, many activities could not exist. For better or for worse, everything is chemical/chemistry!

But it would be misleading to admire the innumerable services and benefits of chemistry without seeking to know the other side of the coin. Indeed, chemistry has a frightening side, because some of these applications have harmful consequences on man and environment. The many fatal accidents caused by the use of chemicals and the tens of thousands of deaths caused by wars waged by man, have rooted this fear in the collective imagination. Despite its hideous facet, chemistry will remain an essential vector of modernity and the accident will also remain the price to pay for progress and for a better use of chemistry! Now, we are forced to live in consensus with chemistry, and find a compromise to reconcile the human will and the forces of nature to limit the damages and make this world joyful and habitable.

The human being must be aware of the enormous challenges that face him in terms of comfort and safety and act accordingly. It must permeate the chemistry of new trends and practices to preserve the human and the environment. One of the alternatives to these real and legitimate concerns will be "***green chemistry***". An ecological chemistry that can respond softly to the modern human health and safety requirements while preserving the quality and life style that we want. This transformation towards the "green", hoped for and demanded by all, requires a new approach in the way to produce the raw materials and how to conceive the strategies of synthesis of new materials. A mutation that will, of course, have important repercussions in how to approach and teach chemistry.

The wish of every chemist is to demystify chemistry, to make it more familiar and more accessible. Hence a new pedagogy that must be articulated around the cognitive taxonomy "Understand - Retain - Apply". By which, the teaching of chemistry cannot remain exclusively verbal, but follow a new path which must involve manipulations, with a very prolonged stay and really profitable in the laboratory, because chemistry is a labor, its space a laboratory. Chemistry will be tomorrow, through teaching and research, the most promising vector in the emergence of a consumer goods industry, integrating the concept of sustainable development and the preservation of the environment.

“POLYMER EDUCATION AT FERHAT ABBAS SÉTIF-1 UNIVERSITY, SÉTIF, ALGERIA”

Pr. Farid RIAHI

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Abstract

Polymers, also called macromolecules, are materials that are widely used in different applications and fields including those of the automobile, building, medicine, packaging, etc. Their outstanding properties, low cost of production and processing, make them unique among not only general purpose materials but also engineering and highly technical ones. University and college students majoring in Chemistry should therefore pursue an adequate education and training in polymer science and engineering. Study programs should cover all aspects of polymer chemistry, processing, characterization and testing. In this presentation, we give an overview of the polymer program taught and proposed for students, at both the undergraduate and graduate levels, at the Process Engineering department of Ferhat Abbas University, Sétif 1, Algeria. A comparison is made with the polymer program proposed at the former “Plastics and Rubber Engineering department” of The Algerian Institute of Petroleum (IAP), Boumerdes, Algeria.

"GREEN CHEMISTRY: PRINCIPLES, CONDITIONS, SYNTHESIS PATHWAYS AND FUTURE CHALLENGES"

Fatima Zohra ZEGGAI

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Abstract

Over the course of the past decade, green chemistry has demonstrated how fundamental scientific methodologies can protect human health and the environment in an economically beneficial manner. Green chemistry is a part of the sustainable development concept; its history and origins are described. As Anastas has pointed out, the guiding principle is the design of environmentally benign products and processes (benign by design). Green Chemistry has a framework of a cohesive set of Twelve Principles, which will be systematically surveyed in this critical presentation. Current and future chemists are being trained to design products and processes with an increased awareness for environmental impact. Outreach activities within the green chemistry community highlight the potential for chemistry to solve many of the global environmental challenges we now face.

Keywords

Green engineering, Chemical Society

"SUSTAINABLE INNOVATION AND GREEN ECONOMY IN ALGERIA BETWEEN MANAGEMENT OF THE RISKS AND IMPACT STRENGTH OF TERRITORIES"

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Abstract

The scientific research is a set of actions to produce and develop the knowledge and the knowledge management. Today, registered in a social, economic, institutional and legal frame, it leans on a cultural dimension to know and to understand the nature, to answer the concerns and the good property for the citizen without compromising its security.

Translated into research project and strengthened by program of even operational academic, professional training, from now on, the search is in the public interest aiming at the impact strength of territories first and foremost central. She has to bring long-lasting solutions to the problems which the socio-economic development of society will not miss to engender.

Furthermore, constructed on scientific basis on the academic knowledge and the conceptualization of the practical and social knowledge's, based on the technological, organizational and societal innovation will be the basis of a green economy within the framework of the sustainable development.

This presentation handles the joint between the scientific research and the technological development, the innovation and the sustainable development as well as the green economy, between the assets and the constraints of any study integrating the risk and the sources of multidimensional danger.

Keywords

Safety, Responsibility, City, Environment, Green Chemistry, Green Economy, Sustainable development, New Technology , Clean Industry, Risk Hazard .

"NANOSCIENCE AND NANOTECHNOLOGY AT THE UNIVERSITY OF SÉTIF"

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Abstract

The humanity in this early 21st century is experiencing a technological evolution at an unprecedented speed. This is mainly due to the transition from microscale to nanoscale technology supported by a continuous decrease of the size of electronic components and by a development of dedicated characterization tools. During the last two decades, the word has observed a tremendous research and development activity in the field of Nanotechnology. Nowadays, mankind witnesses a great impact of what is commonly called "Nano" on the everyday life. Scientists, industrials, economists, and also governments are aware of such key technology. In this context, Algeria is willing to participate to the evolution of nanotechnology and to develop in the long-term a tight interconnection between the nanoscience and nanotechnology research and the industry. In this presentation, I will talk about how we plan to develop the Nano field in Algeria and more specifically in Setif. In a second part of the talk, I will present briefly a material which supports a new phase of matter and could revolutionize nanotechnology, namely, the topological insulator. I will present some of my recorded "spectacular" electronic structures obtained from a topological insulator.

ORAL PRESENTATIONS

"IMPACT OF CHEMISTRY IN MEDICINE"

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Abstract

Chemistry is a science of nature that studies matter and its transformations (chemical elements in the free state, atomic and atomic ions); it also studies their combinations by chemical bonds. The reaction mechanisms involved in chemical processes or physical equilibrium between two forms promote the reaction of synthesis, addition, combination or decomposition, phase separation or extraction (for example of antioxidants from plants).Different chemical analyses make it possible to know the composition of any element in the human body, so in case of illnesses the treatment is more easier. The selective marking opens the way to a coherent reaction pattern in medical x-ray studies. The chemical synthesis of appropriate drugs contributes to the increase of life expectancy; however, the over use of these drugs causes many problems (such as pollution), since, molecules or their summary products of degradation, are found in waste water. Besides chemistry interferes by its methods like adsorption, biodegradation, electrocoagulation and others that are used to protect the health-environment by eliminating toxic elements. Talking about diagnostic, to find what kind of pathology the doctor must know all the physiological places and compositions of each molecule in the body and if they are abnormal or not. In this sense, he must know the effect of drug interactions in the body by a thorough study of the active sites of the molecule. During dosage, the clinician must know the principle of the chemical reactions involved such as oxydo-reduction, acid-base reaction or complexation... He has also to know the structure of drugs necessary to follow their pharmacological effects. Therefore, basic sciences such as chemistry, biochemistry and biology are essential for the treatment of any diseases and, as it is said, "prevention is better than cure". Medical officers must review the chemistry program and the quality of teaching the essential chemistry topics to cope adequately with the patients.

Key words: Pathology, Chemistry, Biology, Biochemistry, Dosage

"THERMAL DEGRADATION STUDY OF REVERSIBLE CROSSLINKED POLYETHYLENES"

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Abstract

LDPE is used as an insulating material in several applications [1]. The modification of the LDPE by crosslinking can improve some of its properties [2]. The thermal transitions are highlighted using the Differential Scanning Calorimetry (DSC) and thermal degradation behaviour and stability of reversible crosslinked low-density polyethylene (LDPE) formulations were analysed using Thermo Gravimetric Analysis (TGA). Mathematical approaches such as those of Kissinger, Ozawa, Friedman and Coats-Redfern [3] were used.

The kinetic parameters of these formulations, i.e. activation energy (E_a), order of reaction (n), and frequency factor (A), were studied from room temperature up to 800 °C and at four heating rates (i.e. 5, 10, 15 and 20 °C/min). The stability of the formulations was found to increase with the concentration of crosslinking system (ratios of peroxide, accelerator and sulphur), revealing its anti-oxidative ability. This stability depends on the proportion of the constituents. Moreover, the incorporation of sulphur in the formulations leads to an improvement in their thermal degradation behaviour.

Keywords

Chemistry Education, Responsible Education, Research and Innovation, Green Chemistry, Nanotechnology, Nanomaterials and Nano-chemistry, Convergence of Biology and Chemistry, Teachers' Training

References

[1] A. A. Basfar, Flammability of radiation cross-linked low-density polyethylene as an insulating material for ware and cable, *Radiation Physics and Chemistry,* Vol.63, (2002), 505-508.

[2] I. Krupa, A. S. Luyt, Thermal properties of uncross-linked and cross-linked LLDPE/Wax blends, *Polymer degradation and Stability,* Vol. 70 (2000), 111-117.

[3] W. W. W. Wendlandt, Thermal methods of analysis in chemical analysis, A Series of monographs on Analytical Chemistry and I Applications, 2nd Ed. Wiley-New York (1974), Vol. 19, 289-294.

"ELECTROCHEMICAL GROWTH OF ZINC AND CUPROUS OXIDES NANOSTRUCTURES"

Loubna MENTAR

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Abstract

In recent years, the synthesis of ***Transparent Conducting Oxides***(TCO)crystals with well-defined dimensions has attracted extraordinary interest in order to realize their unique properties that not only depend on their chemical composition, but also on their shape, structure, phase, size, and size distribution [1, 2]. Zinc and cuprous oxides are two of the most promising metallic oxides semiconductors materials for nanotechnology due to their range of potential applications such as sensors, photovoltaic cells, light-emitting diodes and nanogenerators. Over the past years, many growth methods, such as anodic oxidation, chemical vapor deposition (CVD), pulse laser deposition (PLD), magnetron sputtering, molecular beam epitaxy (MBE) and electrochemical deposition have been used to prepare oxides nanostructures.The electrochemical deposition represents a simple and inexpensive solution based method for synthesis of semiconductors nanostructures. In effect, electrodeposition of zinc oxide (ZnO) and cuprous oxide (Cu_2O) are a versatile growth method and many various nanostructures can be easily designed by this technique. Also, this latter technique has a great advantage in preparing oxides semiconductors nanostructures over conductive substrates due to the low cost and simple equipment used [3,4].

In this work, ZnO and Cu_2O nanostructures prepared by electrochemical deposition (ECD) method from aqueous metallic solution onto fluorine doped tin oxide (FTO) coated glass substrates were investigated. A systematic study of different parameters of deposition on the electrochemical, surface morphology, structural and optical properties of theses nanostructures were examined.

Characterization of obtained nanostructures was realized using conventional electrochemical techniques (cyclic voltammetry, Mott-Schottky), atomic force microscopy (AFM), scanning electron microscopy (SEM), X-ray diffraction (XRD), UV-vis and photoluminescence techniques.

Keywords: Nanotechnology, Nanomaterials, Nano-chemistry

References

1. X. Lan, J. Y. Zhang, H. Gao, T. M. Wang. (2011). *CrystEngComm*, 13, 633-636.
2. S. Chatterjee, S. Gohil, B. Chalke and P. Ayyub. (2009). J.Nanosci. *Nanotechnol.*, 9 (8), 4792-4796.
3. S. Laidoudi, A.Y. Bioud, A. Azizi, G. Schmerber, J. Bartringer, S. Barre, A. Dinia. (2013*). Semicond. Sci. Technol.* 28, 115005-115012**.**
4. L. Mentar, O. Baka, M.R. Khelladi, A. Azizi, S.Velumani, G. Schmerber, A. Dinia. (2015). *J. Mater Sci: Mater Electron,* 26, 1217.

“TENSILE PROPERTIES, MORPHOLOGY, AND THERMAL BEHAVIOR OF PVC COMPOSITES CONTAINING OLIVE RESIDUE FLOUR TREATED BY GAMMA IRRADIATION”

Nadira BELLILI

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Abstract

In this study, gamma irradiation treatments were used to improve the compatibility between poly (vinyl chloride) PVC and olive residue flour (ORF). The blends were subjected to gamma irradiation at doses of 10 and 70 kGy. The mechanical, thermal and morphological behaviours of those blends have been assessed. The irradiated blends exhibit better thermal properties, higher tensile modulus, elongation and strength at break than those of non irradiated blends.

Keywords

Blend, Natural filler, PVC, Gamma Irradiation

"THE ROLE OF COMPUTATIONAL CHEMISTRY IN THE EDUCATION OF UNDERGRADUATES"

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Abstract

In recent years the computational science is considered by many scientific researchers as being the fourth leg of modern science and a joining experimental, observational and theoretical science. Computational chemistry is considered as one of the most important domains of modern-day research in the computational sciences. It has a wide area of practical applications. Quantum and computational approaches of chemical sciences have opened up a new aspect of research and education through which we have not only been able to correlate between a physiochemical experimental results and computational descriptors. We can also use them to understand characteristic properties of the materials and to make specific predictions of experimentally observable phenomena for real materials besides designing new materials. Chemistry research increasingly uses computation as an important tool. On the other hand, we know that the majority of today's university students are technologically savvy and are often more comfortable using computers. Accordingly, our path to education of chemistry should reflect on this. According to my experience in the field of university education and to the research domain of computational chemistry (Chemometrics and Theoretical Chemistry Laboratory, University of Lyon1) we try in this work to find an answer to this question: What does computational chemistry allow us to do in the education which cannot be done using traditional chemistry?

References

1. C. R. Metz, S. C. Sendlinger, (2010). *Journal Of Computational Science Education*, 1, 32.
2. B. T. Miller 1 , R. P. Singh , V. Schalk , Y. Pevzner , J. Sun , C. S. Miller , S. Boresch , T. Ichiye, B. R. Brooks, H. L. Woodcock (2014). *PLOS ComputationalBiology*, 10, 7.
3. H.-J. Fan, J. Heads, D. Tran, N. Elechi (2015). *International Journal of Information and Education Technology,* 5, 188.

POSTERS

“VALORIZATION OF AGRICULTURAL WASTE BIOMATERIAL FOR PESTICIDE ELIMINATION IN CONTAMINATION WATER”

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Abstract

Raw Date Stones (DS) are investigated for their potential to remove pesticide acid (PA) from aqueous solution. By adsorption technique; Investigations showed that the raw date stones it plays a role as biosorbant .The results evidently indicated that date stones would be suitable biosorbant for Pesticide acid in wastewater under specific conditions. The obtained adsorption capacity was 7 mg/g at room temperature and 4 day contact time.

Keywords

Adsorption, biomaterial, Biosorbent, date stones, pesticide acid, valorization.

‘APPLICATIONS OF COORDINATION COMPLEXES’

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Abstract

Now, the diversity of modern coordination chemistry and the development of coordination chemistry into a link between different fields of modern chemistry was impressively demonstrated. The Schiff base ligands proved to be an important class of the chelating agents as far as the coordination chemistry is concerned, and this is mainly due to their easy synthesis, electronic properties and the tendency to form stable complexes with most of the transition metals. These properties attract a large number of applications like those involved in the analytical chemistry field. They can even serve as electrochemical catalysts either in homogeneous or heterogeneous catalysis for alcanes oxidation, alkenes epoxidation, sensors and corrosions inhibitors as well. Accordingly, the O-monoalkylated reaction using 3-bromo propyl-N-pyrrole and dihydroxylatedacetophenone derivative was used to prepare a novel pyrrolic that was deliberately chosen as electropolymerizable monomer to elaborate poly(pyrrole) films containing metallic centres useful as redox mediators covalently grafted on surfaces of modified electrodes. So, we have initiated the synthesis of two original pyrrole-Ni(II)-and Cu(II)-Schiff base complexes. These pyrrolic complexes were electropolymerized onto different electrode surfaces. This electropolymerization was performed in acetonitrile via anodic oxidation of pyrrolic moieties by cyclic voltammetry. The efficiency of the electrochemical polymerization was investigated as a function of several parameters such as the nature of the electrode material, the number of voltammetric scans and the scan rate dependence. The electrodeposited poly(pyrrole) films onto ITO surface was characterized by X-ray diffraction (XRD) and atomic force microscopy (AFM). This poly(pyrrole) matrix, containing metallic centers, was found to have good electrocatalytic properties towards the electrooxidation of alcohols and electroreduction of CO_2, alkyls and aryls halides.

Keywords

Coordination chemistry, Metal (II) complexes, modified electrodes, AFM studies, electrooxidation, electroreduction.

“STUDY OF THE ANTIOXIDANT ACTIVITY OF THE PLANT LEAVES EXTRACTS EXISTS IN ALGERIA”

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Abstract

The antioxidant activity of plant extracts will be used for this study. The extracts are obtained by extraction from the leaves of a plant. The sample was harvested at Ahmed Selem from the Skikda region. Several steps are necessary to characterize the antioxidant proprieties. The evaluation of the antioxidant capacity is determined by trapping the stable free radical DPPH.

The phytochemical screening of the extracts indicates the presence of polyphenol compounds and tannins. The antioxidant activity of the extracts of the leaves with deferent solvents (methanol/water (80/20, v / v) and MeOH / water, acidified at 1%) demonstrated the best inhibitory efficiency of 90.4% and 92.7%. The dosage of total polyphenols and flavonoids shows the plant richness of these compounds.

Keywords

Plant extract, antioxidant activity, dosage, polyphenol

"SORPTION OF METHYLENE BLEU ON AGRICULTURAL WASTE BEAN PEEL POWDER"

Ibtissem KAHOUL

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Abstract

Dyes are used in many industrial sectors such as textile, paper, leather and food and cosmetic industries [1] Dyes are known to be toxic and persistent substances in the environment [2] ; They require physico-chemical techniques to degrade them. Adsorption is often used to treat waste water due to the efficient elimination of organic micropollutants and due to economic considerations [3, 4].

Methylene blue, MB, is selected as a model organic compound because it is known to adsorb more easily onto solids and in order to evaluate the behavior of sorbent for the removal of organic pollutants from its aqueous solutions. MB has wider applications, which include textile, leather, pulp and paper, temporary hair colorant, dyeing cottons, wools, coating for paper stock and as analytical reagent [5, 6].

In this work, the potential of adsorption of MB from aqueous solution by agricultural waste peel bean (EH) resulting from the water treatment processes was studied. The adsorption characteristics were explored using well-established and effective parameters including the effect of pH, contact time, adsorbent dosage, initial concentration. Experimental sorption isotherms were fitted to the Langmuir and Freundlich isotherm models. The pseudo first, pseudo-second order models were used to study the sorption kinetics.

The elimination ratio obtained with new adsorbents was in the range from 80%. The time necessary to attain the adsorption equilibrium was 120 min. The EH powder can be used as an effective, low cost, and eco-friendly green adsorbent for the removal of MB from aqueous solution.

Key words; Adsorption, Environment, Agricultural waste, Organic pollutants

References

[1] Batzias F.A. et D.K. Sidiras, (2007). Dye adsorption by prehydrolysed beech sawdust in batch and fixed-bed systems. Bioresour.Technol., 98, 1208- 1217.
[2] Tan I.A.W, B.H. Hameed et A.L. Ahmad (2007).Equilibrium and kinetic studies on basic dye adsorption by oil palm fibre activated carbon. Chem. Eng. J., 127, 111- 119.
[3] T. Robinson, B. Chandran, P. Nigam, Removal of dyes from a synthetic textile dye effluent by biosorption on apple pomace and wheat straw, Water Res. 36 (2002) 2824–2830.
[4] J. Qi, Z. Li, Y. Guo, H. Xu, Adsorption of phenolic compounds on micro- and mesoporous rice husk-based active carbons, Mater. Chem. Phys. 87 (2004) 96–101.
[5] R. Han, Y. Wang, P. Han, J. Shi, J. Yang, Y. Lu, J. Hazard. Mater., 137 (2006) 550.
[6] Yogesh C. Sharma and Uma, J. Chem. Eng. Data, 55 (2010) 435.

“REMOVAL OF TWEEN 80 BY ADSORPTION ONTO MONTMORILLONITE”

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Abstract

Contamination of waste water has been a serious concern all over the world due to exposure to many sources of pollution without appropriate treatment system. Surfactants constitute a very important group of compounds in modern life. They are useful in a large variety of usual products like soaps, detergents for household cleaning or in pharmaceuticals and personal care products. They are also found in industrial applications, in many fields like paints, cosmetics, pharmaceuticals, agrochemicals, paper coatings, and environmental remediation [1]. This study deals with the development of raw montmorillonite as an adsorbent for the treatment of waste water, used this method to test in order to reduce pollution. The adsorption processes with clays could be a simple, selective and economic conventional physicochemical treatment alternative. Our main objective of this work was to study the adsorption of Tween 80 (surfactant) on the raw montmorillonite with different parameters. The main factors such as pH, amount sorbent, adsorbate concentration temperature and the stirring speed on the sorption of Tween 80 has been investigated in detail. The adsorbents were characterized by FTIR spectroscopic and chemical analysis. The kinetics modelling was correctly described by the pseudo-second order model and the adsorption isotherm was characterized by Freundlich model. Values DG°, DH° show that the adsorption process was spontaneous and endothermic. The value of ΔS ° shows that the order increases adsorbed phase.

Keywords

Montmorillonite; Tween 80; surfactant, Adsorption

Reference

[1] D. Myers, *Surfactant Science and Technology*, third ed., Wiley-Interscience, Hoboken, New Jersey, 2006.

“NANOSTRUCTURED CUPROUS OXIDE N-TYPE SEMICONDUCTORS BY ELECTROCHEMICAL DEPOSITION FOR PHOTOVOLTAIC APPLICATION”

Abdelmadjid HERBADJI

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Abstract

The nanomaterial are of great interest in several technological fields, particularly nanotechnologies, and among these nanomaterials, transparent conductive oxides (TCO), combining electrical conductivity and transmittance in the visible range. Cuprous oxide (Cu_2O) is a material of this large family of TCO. Considered as one of the promising TCO materials in the manufacture of solar cells. With a direct band gap of 2.0 eV, non-toxicity, and abundance of source materials, is known as a suitable material for photovoltaic energy conversion [1]–[3]. Although the theoretical efficiency of Cu_2O solar cells is about 19 %, the best-reported efficiency is only between 1 % and 2 %. The low efficiency was attributed to the natural p-type conduction in Cu_2O [4], which prevented a p-n homo-junction in Cu_2O.

In this works, the electrochemical deposition method has been used to prepare pure Cu_2O n-type nanostructures onto fluorine tin oxide (FTO) substrates from an aqueous cupric sulphate solution, and different concentrations of $CuCl_2$ to change the conduction type from p type to n type for solar cell application was studied. The effects of $CuCl_2$ on Cu_2O thin films were investigated by X-ray diffraction (XRD), atomic force microscopy (AFM), UV-Vis spectrophotometry, Mott-Schottky (M-S) plots and photocurrent. The measurements of X-rays diffraction (XRD) confirms that the films are pure Cu_2O with polycrystalline structure and (111) phase which is strong out of plane texture for Cu_2O films with 0.0125 M $CuCl_2$. The M-S plot and photocurrent measurement shows that the conduction type changes from p-type to n-type with increasing of carrier density. The optical measurements show a direct band gap depending on the concentration of $CuCl_2$.

Keywords

Nanotechnology, Nanomaterials

“A NEW ALTERNATIVE NATURAL ADSORBENT FOR THE REMOVAL OF CATIONIC DYE FROM AQUEOUS SOLUTION”

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Abstract

The adsorption of methylene blue is carried out on a natural material treated firstly with ASD and then activated either by SCIM or by PPIM to obtained two materials named respectively MAN and MAK. Fourier transform infrared FTIR spectroscopy and pHpzc analysis were carried out in this study The adsorptive affinity of these materials for Methylene blue was studied as a function of dye–adsorbent contact time, initial pH of the solution, initial dye concentration, temperature, and humic acid concentration. Rate constants of pseudo-first order and pseudo-second order were calculated to analyze the dynamic of the sorption process; they showed that sorption kinetics followed a pseudo-second order model, Among the tested isotherm models, the Sips isotherm was found to be the most relevant to describe MB sorption onto MAN and MAK. It should also be noted that the equilibrium time for the two materials MAN and MAK are respectively 120 and 100 min. The sorption capacity of MAK (1500 mg/g) was found to be much greater than that of MAN (250 mg/g). Thermodynamic parameters, such as changes in standard free energy, enthalpy, and entropy, were also evaluated and the results suggested that the sorption reaction was spontaneous and endothermic in nature. The potential of MAN and MAK, an easily available and low-cost material, to be used as an alternative biosorbent material for the removal of a dye, MB, from aqueous solutions was therefore confirmed.

Keywords

Microwave, Degradation, Fenton, Antibiotic

“A NEW ALTERNATIVE PROCESS OF DEGRADATION OF SULFAMETHOXAZOLE SMX, BY CONVENTIONAL FENTON AND FENTON ASSISTED BY MICROWAVE (MW)”

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Abstract

Pharmaceuticals products such as SMX are released to the environment in trace amounts (ng/l to mg/l) by humans and animals, at a time in their original form and as metabolites. Antibiotics are contaminants that are hazardous to the aquatic environment due to their adverse effects on aquatic life and humans. They can cause at low concentration a disturbance in the water treatment process and increase the proliferation of antibiotic-resistant pathogens. It is therefore important to develop effective techniques to limit their presence in aquatic environments. Advanced oxidation processes (POA) appear more practical in comparison with other conventional techniques because they are based on the production of hydroxyl radicals OH. The objective of this study was to evaluate the degradation of sulfamethoxazole (SMX) by Fenton process assisted by the microwave ($MW/Fe/H_2O_2$). So concentrations of oxygen peroxide, ferrous ion and microwave power were optimized. The results indicate that the degradation of SMX by MW / Fe / H_2O_2 obey a pseudo-first order kinetics. The treatment of SMX solutions (20 mg/L) by microwaves in the presence of Fenton's reagents showed that they had a very positive effect on SMX degradation since they gave higher reaction rates and very short time of degradation (is less than 5 min) compared to the conventional Fenton process. The process of SMX degradation was accelerated by increasing the heating power applied, we note also that a cooling between two heaters was respected. The optimum pH of degradation in conventional or MW-assisted Fenton is equal to 3. The study of the effect of the ionic strength of the treated solutions showed that the carbonate and sulfate ions increase the rate of SMX degradation.

Keywords

Microwave, Degradation, Fenton, Antibiotic

“APPLICATION OF A NEW NATURAL MATERIAL «WILD CAROB » TREATED WITH NAOH FOR THE ADSORPTION OF CRYSTAL VIOLET”

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Abstract

The objectives of the present investigation were to investigate the interactions between dye and low cost adsorbent and to study the adsorption mechanism of dye onto this biosorbent. Wild carob was a waste itself and throughout the year, it can be found in abundant quantities in forest. NaOH-treated wild carob has been used as an adsorbent for the removal of ethyl violet (CV) from aqueous solutions. Some characterization tests have been carried out, namely BET, SEM, FTIR and the isoelectric point (pHpzc), in order to knowing the physico-chemical and textural properties of our modified material. From the results obtained, it appears that the absorption of the CV decreases with the increase of the temperature, increases with the contact time at optimum natural pH. Rate constants of pseudo-first order and pseudo-second order were calculated to analyze the dynamic of the sorption process; they showed that sorption kinetics followed a pseudo-second order model, Among the tested isotherm models, the Sips isotherm was found to be the most relevant to describe MB sorption onto NaOH-treated wild carob.

Keywords

Wild carob, crystal violet, adsorption process, water treatment, natural supports.

"ADSORPTION AND CORROSION INHIBITION OF NEW SYNTHESIZED SCHIFF BASE ON MILD STEEL XC48 IN HCL SOLUTION"

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Abstract

Corrosion is the destructive attacks of metals by its environment. Corrosion of metals is a major industrial problem that has attracted a lot of investigators in recent years [1, 2]. Many organic compounds containing oxygen, nitrogen and sulphur have been studied as corrosion inhibitors for metals. Corrosion inhibitors are of great practical importance, being extensively employed in minimizing metallic waste in engineering materials [3, 4]. The efficiency of these compounds depends upon the electron density present around the hetero atoms.

The condensation of 4, 4'-diaminodiphényl ether with 2,4-dihydroxy salicylaldehyde in absolute EtOH in a molar ratio 2:1 gave the Schiff base 4,4'- bis (2,4-dihydroxy salicylaldehyde) diphenyletherdiimine (H_2L). The inhibiting effect of this Schiff base (H_2L) on the corrosion of the mild steel XC48 in acidic media HCl has been studied by weight loss, electrochemical impedance spectroscopy and Tafel polarization measurements

Keywords

Schiff bases; corrosion; gravimetric; polarization; ESI; AFM; SEM.

"SPIN CROSSOVER (SCO) IRON (II) COORDINATION POLYMER CHAINS: SYNTHESES, STRUCTURES AND MAGNETIC CHARACTERIZATIONS OF [FE(AQIN)2(μ2-M(CN)4)] (M = NI(II), PT(II), AQIN = QUINOLIN-8-AMINE)"

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Abstract

The design of new coordination complexes exhibiting the spin crossover phenomenon (*SCO*) is one of the most relevant challenges in the field of magnetic molecular materials.[1-4] Up to now, most of the reported *SCO*Fe(II)-based examples refer to mononuclear compounds. In such discrete systems, the intermolecular interactions (p-stacking, hydrogen bonding and van der Waals interactions), which generate the supramolecular architecture in the solid state, play a crucial role in the information transmission of the magneto-elastic cooperative effects at the origin of the magnetic bistability. However, the non covalent character of those contacts hardens the anticipated design of the supramolecular organization in the crystal, and consequently makes difficult the tailoring of the *SCO* characteristics. To better explore the cooperative effect between the active metal ions, a new approach based on the use of planar anions, and more distinctly to shift the *SCO* transition below room temperature, we use chelating co-ligand displaying lower crystal field energies, such as the quinolin-8-amine (aqin). We report herein the syntheses and the full structural characterizations including thermal variation of the crystallographic structural data, and magnetic properties of two new *SCO* Fe(II) coordination polymer chains of formula $[Fe(aqin)_2(m_2\text{-}M(CN)_4)]$ (M = Ni^{II} (**1**) and Pt^{II} (**2**)) involving tetracyanometallate anions as bridging ligands.

“ELECTRODEPOSITION AND CHARACTERIZATION OF NANOSTRUCTURED CU2O/AZO/ZNO HETEROJUNCTION”

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Abstract

In recent years, nanomaterials have shown great impact on the modern technology owing to their incredible properties. As results, the nanotechnology was widely applied in many domain such us the renewable energy field. Previous researches have established that, using a nanostructured transparent conductive oxides (TCO) will improve the performance of the photovoltaic devices [1]. Particularly, nanostructured Cu_2O/ZnO p-n heterojunctions has received considerable attention as the key technology in many electronic devices such as solar cells, diodes, transistors and light emitting diodes [2, 3]. Cu_2O/ ZnO heterojunctions have been synthesized by many techniques including chemical and physical vapor deposition that require sophisticated expensive equipment and employ vacuum and/or high temperature. However, the electrochemical deposition is promising alternative techniques for the development of nanomaterials at a significantly lower temperature and using simple process [4, 5].

In this work, nanostructured Cu_2O/AZO/ZnO tri-layer heterojunction was prepared by electrochemical deposition on transparent fluorine doped tin oxide substrate (FTO). The obtained device was characterized by different techniques. The structural characterization by XRD analysis revealed a high crystallinity of ZnO and Cu_2O following wurtzite and cubic structures, respectively. Studying the optical properties by UV-Vis indicate high absorbance in UV and visible range with optical transmission of 65 %. Scanning electron microscopy (SEM) observations confirm the good crystallinity of the device, where large nano-cubes of Cu_2O were spread over a flat surface of AZO/ZnO. The current-voltage measurements indicate well rectifying behaviour with turn on voltage of 0.5 V.

Keywords

Nanostructure, Photovoltaic, Electrodeposition, TCO, Heterojunction, ZnO, Cu2O.

References

1. H. K. Lee, M. S. Kim, J. S. Yu. (2011). *Nanotechnology*, 22, 445602.
2. T. Minami, H. Tanaka, T. Shimakawa, T. Miyata and H. Sato. (2004). *Jpn. J. Appl. Phys.*, 43, L917.
3. X. Fan, G. Fang, S. Guo, N. Liu, H. Gao, P. Qin, S. Li, H. Long, Q. Zheng, X. Zhao. (2011). *Nanoscale Res. Lett.*, 6, 546.
4. H. Lahmar, A. Azizi, G. Schmerber, A. Dinia. (2016). *RSC Advances*, 6, 68663.
5. H. Lahmar, F. Setifi, A. Azizi, G. Schmerber and A. Dinia. (2017).*Journal of Alloys and Compounds*, 718, 36–45.

DYNAMIC MECHANICAL AND THERMAL ANALYSES OF POLY(LACTIC ACID)/POLY(ETHYLENE GLYCOL) BLENDS

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Blends of poly(lactic acid) (PLA) and poly(ethylene glycol) (PEG) with various contents (0, 5, 10, 15, 20 and 30 weight %) and with different molecular weights ($\overline{M}_w$ = 1000, 4000 and 6000 g/mol), called respectively PEG1, PEG2, and PEG3 were prepared by melt blending. Since glass transition temperature (Tg), Tα and loss factor (tan δ) are relevant indicators of polymer chain mobility, plasticisation has been studied by dynamic mechanical analysis (DMA) and differential scanning calorimetry (DSC). Low molecular weight PEG enable increased miscibility with PLA and more efficient reduction of glass transition temperature (Tg) for concentrations of PEG less than 20%. This effect is not only enhanced by the low molecular weight but also by increasing its content up to 20%. As expected, both Tα and Tg decrease when increasing PEG molar mass and content up to 20%, which demonstrates the effectiveness of PEG to act as a plasticizer of PLA.The plasticisation of PLA with PEG effectively lowers Tg and cold crystallization temperatures. The use of low molecular weight PEG decreases the intermolecular forces and increases the mobility of the polymer chains, by improving the flexibility of PLA. The effect of the use of various molecular weights of PEG is confirmed by thermogravimetric analysis (TGA).

Polyethylene glycols (PEG), also known as macrogels, are liquid or solid polymers of general formula $H(OCH_2CH_2)_nOH$. Low molecular weight PEG is in the liquid form, whereas higher molecular weight PEG are in the solid form at room temperature. PEG are suitable plasticizers for PLA because of their miscibility, biodegradability, and food contact applications. As most of the researchers use high molecular weight PEG as plasticizers, there is about no literature examining the plasticizing effect of low molecular weight PEG on PLA [15-16].

The addition of PEG plasticizer to lower the glass transition temperature (Tg) and increase the crystallinity of the blends is attributed to the enhanced segmental motion of the PLA molecular chains.

PEGs blended with PLA decrease the glass transition temperature and modify the melting and crystallization characteristics. The PEGs are the most efficient for both Tα and Tg reduction and it clearly appears that for compositions up to 20 w% of plasticizer, all the blends present a limit of miscibility as the glass transition temperature reaches a plateau value.

References

1 N. Stoehr, B; Baudrit, E. Haberstroh, M. Nase, P. Heidemeyer, and M. Bastian, (2014). *Journal of Applied Polymer Science*, 12, 40394–40403.

2 F. J. Li, J. Z. Liang, S. D. Zhang, and B. Zhu, (2015) , *Journal of Polymers and the Environment*, 3, 407–415.

‘REOLOGICAL BEHAVIOR OF ALUMINA CERAMIC’

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Abstract

The rheological behavior of ceramic oxide hydroxide alumina pastes with high solid loading is investigated. In order to enable an adequate and experimentally rheological characterization, the measurements are carried out with a Rheostress viscometer under isothermal conditions [1].

Various compositions of a commercial AlOOH powder and binder mixture are investigated. We discuss the variation of loss modulus *G’*, storage modulus *G’’*, apparent and complex viscosities η, η* as function of frequency and shear rate [2]. The solid phase used here is the boehmite; the most important precursor for the γ-Al_2O_3 phase for several applications such as catalysts or functional layers of ceramics. Solid phase compositions used are justified by the applications of boehmite in the manufacturing of catalytic materials.

A transition zone that appears at a concentration of 55% wt of the solid phase (Pural) and at which the rheological behavior changes from viscoelastic to elastic is observed. This transition is of a importance as far as ceramic manufacturing is concerned [3].

References

1. H. Sarraf. (2009). *Appl. Rheol*, 19, 119-120.
2. J. Gotz, W. Kreibich, M. Peciar. (2002). *Rheol. Acta*, 41, 134-143.
3. F. Andreola, E. Castellini, M. Romagnoli. (2002). *Am. Ceram. Soc. Bull*, 81, 53-56.

‘EVALUATION OF THERMAL AND FIRE BEHAVIORS OF POLYMER AND LAYERED DOUBLE HYDROXIDES NANOCOMPOSITES USING THERMOGRAVIMETRIC AND CONE CALORIMETER TESTS’

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Abstract

Magnesium based layered double hydroxides (LDH) are lamellar nanomaterials usually added to polymers in order to improve their thermal stability. Currently, these nanofillers constitute a new generation of green flame retardants that combine functional, environmental and safety aspects [1-2].

At present knowledge, the flame retardation action of the LDH nanoparticles is still unknown [3]. In the present contribution, thermogravimetric (TGA) and cone calorimeter testing results are explored to explain the fire retardancy mode of nanocomposites containing less than 10 wt% LDH. The study is carried out on poly(styrene) nanocomposites prepared via styrene bulk polymerization in the presence of dodecylbenzene sulfonate (DBS) LDH nanoparticles. The DBS-LDH/PS nanocomposites, examined by transmission electron microscopy, present an exfoliated morphology.

TGA results showed thermal stability improvement due to carbonaceous residue formation for all the samples containing 1 to 7 wt% nanofiller.

Cone calorimeter test was applied to 7 wt% DBS-HDL/PS samples under oxygen gas and 35 kW/m^{2}incident heat flux. Fire retardation parameters such as peak heat flux (PHRR), opacity intensity, amounts of CO, CO_2, and smokewere improved. At the end of combustion, no residue was observed, indicating that the flame retardant action has taken place in the gaseous phase.

The same strategy was adopted using industrial organophilic montmorillonite, Nanofil® SE 3010, for comparison purpose.

References

1. K. Shanmuganathan, C.J. Ellison (2014).In*C.D. Papaspyrides, P. Kiliaris, Polymer Green Flame Retardants*, pages675-707. Amsterdam, Netherlands: Elsevier Science Ltd.
2. G. Huang, S. Chen, P. Song, P. Lu, C. Wu, H. Liang (2014).*Applied Clay Science*, Vol. 88–89, Pages 78-85.
3. P. K. Kaul, A. J. Samson, G. T. Selvan, IVMV Enoch, P. M. Selvakumar (2017). *Applied Clay Science*, Vo.135, Pages 234-243.

"DEVELOPMENT AND CHARACTERIZATION OF A HYBRID SYSTEM BASED ON POLY (LACTIC ACID) AND UNMODIFIED MONTMORILLONITE"

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Abstract

This research focuses on the study of structure-properties of polymer nanocomposites based on a biodegradable polymer, polylactic acid - PLA, associated with unmodified clay[1]. The films studied were obtained from the extrusion process with water injection. A study of the relationship between elaboration, microstructure and mechanical properties of these nanocomposites PLA / untreated montmorillonite was performed [2]. The structural analysis showed a homogeneous dispersion and formation of a structure mainly intercalated. Thermal analysis showed that the pure PLA as well as its nanocomposite are amporphe. The addition of 4% unmodified clay gives a gain of 25% of the elastic modulus (viscoelastic analysis at T <Tg) and a great improvement in mechanical properties with an increase in the order of 15MPa of the nominal stress, and 150% of the nominal deformation at temperatures above Tg [3,4].

Keywords: hybrid system, nanocomposites, unmodified clay, renewable resources, biodegradable polymer, PLA

References

1. Fedullo N., Scalvons M., Bailly C., Lefebvre J.M., Devaux J., , *Macromol.Symp*., (2006) 233, 235-245,
2. Melt Made Polymer Nanocomposites, G5RD-2000-00348 (2001-2005)
3. Xia. L, Arghavan V. N.,Han E.N., (2012).*J.App.polym.Sci*., 124, 585–594.
4. K. Fukushima, K, Fina.A, Geobaldo.F, A. Venturello, Camino.A, (2012). *Exp. Polym.Lett*, 6, 914–926

“NANOCOMPOSITES BASED ON POLYPROPYLENE-THERMOPLASTIC STARCH REINFORCED WITH STARCH NANOCRISTALS”

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Abstract

This study aimed to develop and characterize a polypropylene-thermoplastic starch based nanocomposite in order to reduce synthetic polymers level in plastics matters and involve biodegradability in the polypropylene matrix [1]. The mixtures were reinforced by starch nanocrystals obtained by acid hydrolysis of corn starch and were performed using an internal mixer. The effect of, starch thermoplastic content, starch nanocristals , compatibilizer on the structural, rheological and mechacanical properties was performed.

Index flow results showed that adding a small quantity of nanocrystals decreased the IF indicating a viscosity increase. Water sensitivity was decreased for compatibilized mixtures . A noticeable reduction of different mechanical parameters was occurred due to the high polarity of compatibilizing agent[2].

Keywords: Nanocomposite, starch, thermoplastic starch, biodegradable, starch nanocrystals, polypropylene

References

5. Lamanna. M. , Dufresne A. , Aranguren M. , et Goyanes S. , (2012). *Polym. Deg.Sta.*, 79, 2021–2026
6. Dufresne A., Castano J., *Starch*, (2016), 86, 1–19

"SYNTHESIS OF GRAPHITE OXIDE: CHARACTERIZATION, MECHANISMS AND PROPERTIES"

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Abstract

Currently, research on graphene-based materials is one of the fastest growing fields in the world. Since its discovery in 2004, the attention of the scientific and industrial communities has focused on its possible applications.

Because of these multiple useful properties, scientists envision multiple applications in various sectors such as touch screens, high-speed chips, electronic components, sensors and biosensors useful for clean and biological technology, hydrogen storage, photovoltaics, batteries, cathodes, nanocomposites, … etc.

Difficulties in obtaining monolayer sheets of graphene due to technological limitations have made all manipulations of materials at the atomic scale inaccessible. Nevertheless, many technologies have been developed to synthesize this material such as mechanical exfoliation and cleavage, chemical vapour deposition (CVD) and thermal graphitization of silicon carbide crystals (SiC). Currently, the most promising methods for the production of graphene nanosheets are based on exfoliation of graphite via chemical oxidation.

The aim of this work is the synthesis of graphene oxides (GOs) by liquid phase oxidation using strong concentrated acids such as H_2SO_4, HNO_3, H_2SO_4/HNO_3 and H_2SO_4/H_2O_2.The oxidation rates and the nature of the surface functional groups were determined according to Boehm's method, FTIR, XPS and XRD techniques. The Boehm's and FTIR techniques revealed that the oxidation treatments introduced a variety of oxygenated functional groups at the surface of graphite. The chemical composition was confirmed with XPS. XRD structural study showed an increase in the interplanar distance due to the intercalation of oxygenated groups within the layered structure.

Keywords: Graphene oxide, surfaces, chemical synthesis, chemical techniques, thermal properties.

"FUNCTIONALIZATION OF GRAPHENE OXIDE WITH ALKYLAMINE AND SILANES: CHARACTERIZATION, MECHANISMS AND PROPERTIES"

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Abstract

Since the successful isolation of graphene by ***Geim and coworkers*** in ***2004***, considerable interests have attracted the scientific and technological communities by the properties and the promising applications of the material. Indeed, two-dimensional (2D) graphene sheets exhibit large aspect ratio, exceptionally high tensile strength (~130 GPa) and modulus (~1,000 GPa), higher flexibility, high adsorption of hydrogen and carbon dioxide, room temperature quantum hall effect, ultrahigh electron mobility and ballistic transport, zero electronic band gap, an excellent thermal conductivity (~ 5,000 W m−1K−1), as well as a high theoretical specific surface area (~2630 m2 g−1).

Graphene sheets stack together to form graphite with an interlayer spacing of 0.34 nm, showing strong in-plane bonding but weak van der Waals forces between layers. Single graphene layer was obtained from Highly Oriented Pyrolytic Graphite Crystal (HOPG) by a cohesive tape method.

The oxidation reactions provide the graphene nanosheets by a variety of oxygenated functions: mainly carboxylics but also phenols, lactones, quinones, hydroxyls and epoxy groups. On the other hand, the electrochemical exfoliation of graphite in the presence of ionic liquids has the advantage to produce highly functionalized graphene nanosheets. Indeed, this functionalization results in an increase in the interlayer space and gives the material a particularly useful hydrophilic character.

Intercalation of alkylammonium ions or n-alkylamine within interlayer space have been reported as a very interesting way to improve the dispersion ability of GO in various environments. In this context, the functionalization of GO with organosilanes was proposed to prepare more stable materials.

In this work, alkylamine and silane molecules have been grafted onto the epoxy, hydroxyl and carboxyl groups resulting from the oxidation reactions of the graphite. The FTIR, XRD, UV-Vis analysis and solubility/affinity towards polar and apolar environments tests were used to characterize the obtained hybrid materials. The results indicated significant improved spacing of graphene planes. The UV-Vis characterization revealed the restoration of the graphenic conjugated structure by intercalation of graphene oxide with alkylamine. However, the silylated materials exhibit the same electronic structure to that of the original graphene oxide. Solutions of GO and functionalized GO in water and organic solvents presented better dispersion and significant stability.

Keywords: Graphene oxide, surfaces, functionalization, chemical grafting, chemical techniques, dispersion.

“BIOMIMETIC OXIDATION REACTIONS OF CATECHOLS RECENT PROGRESS AND FUTURE NEEDS”

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Abstract

An important goal in supramolecular chemistry is the synthesis of molecules that exhibit catalytic activity analogous to the activity of enzymes. A number of catalysts having bio-mimicking activity for different enzymes have been designed by the chemists [1]. Such artificial enzymes have same catalytic function but these are more stable and structurally less complex than enzymes. Synthetic enzyme models are helpful in understanding the mechanistic aspects of enzyme action. Thus the studies on the model compounds mimicking [2] are very useful and promising for the development of new, more efficient bioinspired, environment friendly catalysts which may find future applications in industrial synthesis. Biochemically important processes like catalytic oxidation of 3,5-di-tert-butylcatechol to quinone (Catecholase activity) and hydrolytic reactions[3].

References

7. R. H. Holm, P. Kennepohl, E. I. Solomon. (1996). *Chem. Rev.*, 96, 2239-2314.
8. B. Pignataro.(2009). *Tomorrow's Chemistry Today,* , Germany, 2nd Ed, John Wiley & Sons.
9. E. I. Solomon, M. J. Baldwin, M. D. Lowery. (1992) *Chemical Reviews*, 92, 521-542.

AN INQUIRY INTO STUDENTS' PREFERENCES FOR AND RESPONSES TO TEACHERS' FEEDBACK METHODS IN WRITING,

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Abstract

The current research aims to explore the preferences and responses of third year students at towards teachers' feedback methods in the writing course. This study relied on one instrument for the process of data collection. The tool used was a questionnaire that involved both close-ended questions and open-ended ones, all aimed at investigating students' perceptions towards teachers' feedback methods used during the writing course and whether these methods fit students' preferences or teachers have to follow what students want in order to make their written feedback more effective to improve students writing. It was noticed that although third year LMD students highly value teacher feedback and perceived it to be helpful; they have a marked preference for teacher feedback. Another important finding is that students wanted teachers to correct all the mistakes they made on their papers. Moreover, students preferred to receive a balanced amount of content and from, negative and positive, direct and indirect comments in order to encourage them correct their mistakes and improve their writing skill. Although the conducted research faced a number of limitations, but the findings revealed interesting implications particularly, if the preferences and responses of 3rd year LMD students have been taken into account. In order to test the applicability of the findings to larger population future researches should be done experimentally.

PLASTICIZING EFFECTS OF THE CITRATE ESTERS ON POLYLACTIDE/POLYCAPROLACTONE BLENDS

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Abstract

Due to their low cost and extraordinary versatility, bioplastic materials are expected to overcome the sustainability issues and environmental challenges in the near future [1]. These properties have targeted applications in various fields specifically such as packaging, agricultural, textile, pharmaceutical, electronic or medical domains [2]. However, extensive application of these biobased plastics is still challenged by some inherent limitations, such as brittleness, hydrophilicity, poor moisture and gas barrier, inferior compatibility, poor electrical, thermal and physical properties [1]. Modification is a way to improve these inherent limitations properties and achieve property combinations required for specific applications. A feasible common practice is the incorporation of additives such as plasticizers into both synthetic and biobased polymeric materials to impart flexibility, improve toughness, and lower the glass transition temperature [1, 3]. The aim of our study is to investigate the plasticizing effects of citrate esters on Polylactide/Polycaprolactone (PLA/PCL) blends. The samples were prepared by melt mixing in a plastographe Brabender, and followed by compression molding. The results obtained by differential scanning calorimetry (DSC), confirmed that the addition of the citrate ester resulted in a decrease of the glass transition temperature (Tg). The largest reduction was observed with blends by adding up to 30 wt% of the citrate plasticizer. Moreover, the incorporation of the monomeric plasticizers in the mixtures increases the plasticization of PLA by decreasing its tan δ obtained through the dynamic mechanical analysis (DMA). Thermogravimetric analysis (TGA), confirmed that the addition of the citrate plasticizer has promoted a decrease in thermal stability of PLA.

References

1. T. Mekonnen, P. Mussone, H. Khalil, D. Bressler. (2013). *Journal of material chemistry A*, 1, 13379-13398
2. H.N. Rabetafika, M. Paquot, P. Dubois. (2006). *Base (Online)*, 3, 185-196.
3. B. Imre, B. Pukánszky. (2013). *European polymer journal*, 49. 1215-1233.

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