
ANSOLE DAYS 2021 &
BALEWARE 2021
ANSOLE´s
10th
Anniversary
2011-2021
International
Digital Conference
Theme:
Solar Energy Materials &
Energy-Water Nexus
zoom link
https://jku.zoom.us/j/93192161096?pwd=cUEzcGk1T3BRRGo3MFE4UVF5VzBuZz09
Meeting-ID: 931 9216 1096
Password: ANSOLE
4-5 February 2021
Sponsors:
ISP
UPPSALA UNIVERSITET
ipmt Institute of Polymeric Materials and Testing
JKU JOHANNES KEPLER UNIVERSITÄT LINZ

ANSOLE DAYS 2021 & BALEWARE 2021

Digital **International 10th Anniversary (2011-2021) Conference**
4-5 February 2021

Solar Energy Materials & Water-Energy Nexus

Organizing Institutions

-African Network for Solar Energy e.V., Jena Germany
-Bridging Africa, Latin America and Europe on Water and Renewable Energies Applications
-Institute of Polymeric Materials and Testing (IPMT), Johannes Kepler University (JKU) Linz, Austria
-Faculty of Sciences of Tunis, University of Tunis El-Manar, Tunis, Tunisia

Conference Organizers

Prof. Daniel A. M. Egbe, ANSOLE & BALEWARE Coordinator, IPMT, JKU Linz, Austria
Prof. Samir Romdhane, ANSOLE Regional Representative in North Africa, University of Carthago, Tunisia
Prof. Reinhold Lang, Director of IPMT, JKU Linz, Austria
Prof. Carla Puglia, Director of ISP, Uppsala University, Uppsala Sweden
Dr. Ineke Malsch, *Malsch TechnoValuation, Utrecht, The Netherlands*
Prof. Chérif Dridi, Center of Research on Microelectronics and Nanotechnology (CRMN) of Technopole Sousse,Tunisia
Prof. Maria Teresa Alarcon Herrera, Advanced Materials and Research Centre (CIMAV), Mexico
Mr Harald Kicker, IPMT, JKU Linz, Austria (Technical Support)

Sponsoring Institutions

-International Science Programme, Uppsala University, Uppsala Sweden
-Institute of Polymeric Materials and Testing, Johannes Kepler University Linz Austria

About ANSOLE

The African Network for Solar Energy (ANSOLE) promotes research, education and training in the field of renewable energy among Africans as well as non-Africans with a special focus on - and relationships with - Africa.
As outlined in its by-laws, ANSOLE supports non-profit activities in the field of development aid and cultural exchange with the aim of strengthening the dialogue between the North and African countries (north-south) and among African countries (south-south) on renewable energy.
It endorses the use of renewable energy to the benefit of the social and economic development of Africa as well as environmental protection through:

- Education and training of African scientists, experts and students
- Exchange of students and visiting scientists
- Workshops, conferences and meetings in Africa
- Organizing and implementing projects and programs on renewable energy
- Promoting capacity building in the use of renewable energy in Africa for all

In addition, ANSOLE is involved in facilitating the integration and acceptance of migrants of African origin within the local German society in Jena through the AMAH project (*Anlaufstelle für Menschen afrikanischer Herkunft*-Focal Point for People of African Origin).
ANSOLE members and those acting in the name of ANSOLE accept and act in accordance with the association's by-laws.
The by-laws of ANSOLE can be downloaded here:
https://www.ansole.org/download/2013-11-23-ANSOLE_Satzung_v02.pdf
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Programme

Zoom Link (Accessible only after registration at: https://eveeno.com/150684469)

ANSOLE DAYS 2021 & BALEWARE 2021
4-5 February 2021 - International digital 10th anniversary (2011-2021) conference.
Theme: Solar Energy Materials & Energy-Water Nexus
4 February 9:00-19:00 - Waiting room entry 8:30
5 February 9:00-18:00 - Waiting room entry 8:30
The privacy policy, terms of use, and assistance can be found at
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YouTube Live-Stream: https://tinyurl.com/AnsoleDays2021 for registered and non registered participants!

Thursday, February 4th

Time: 8:30am-19.00 pm CET

Zoom Link	**https://jku.zoom.us/j/93192161096?pwd=cUEzcGk1T3BRRGo3MFE4UVF5VzBuZz09**
8.30-8.45	Access of participants to zoom room
8.45-9.00	*Opening remarks and welcome addresses by Daniel A. M. Egbe & Samir Romdhane*
Session 1	***Moderators: Prof Samir Romdhane & Dr Allé Dioum***
9.00-10.00	**Keynote Lecture: From organic electronics towards bio-organic systems for CO_2 recycling** *Prof. Serdar Sariciftci, Johannes Kepler University Linz, Linz, Austria.*
10.00.10.30	**Invited Lecture: Exploring ethical impacts of nanotechnology for water and sustainable energy** *Dr Ineke Malsch Malsch TechnoValuation, Utrecht, The Netherlands*
10.30-11.00	**Invited Lecture: Underwater Solar Photovoltaics: Status and Pathway** *Prof. Sanket Goel, Institute of Technology and Science (BITS) Pilani, Hyderabad Campus, Hyderabad, India*
11:00-11.30	**Invited Lecture: Solar Calculations and Solar Radiation Power Evaluations using by Programming Languages, C Sharp Code and Python** *Prof. Zuhal ER, Istanbul Technical University, Istanbul, Turkey*
11.30-12.00	**Invited Lecture: Functional Polymer Passivated Dye Sensitized Solar Cell Showing Exceptionally High Light-to-Current Conversion Efficiency** *Dr Mohammed Jasim Uddin*, The University of Texas, Rio Grande Valley, Texas USA
12.00-12.20	**Invited Lecture: Concentrated Solar Thermal activities in The Thermal Process Laboratory Research and Technologies Centre of Energy (Tunisia)** Prof. AmenAllah Guizani, *Thermal Process Laboratory Research and Technologies Centre of Energy, BP 95 Hamam Lif, 2050 Tunisia*
12.20-12.40	**Inverted Structure Solar Cell based on Nanofibers of Anthracene Containing PPE-PPV Copolymer: Limits and Challenges** *Dr. Shaimaa A. Mohamed, Zewail City of Science and Technology, Giza, Egypt.*
12.40-13.00	**Concentrated sunlight-driven photocatalysis and green synthesis of Zinc Oxide nanostructures for sustainable water purification** *Ms Asma El Golli, NANOMISENE Lab LR16CRMN01, Center of Research on Microelectronics and Nanotechnology of Sousse, Technopark of Sousse, Tunisia*
13.00-14.00	**Lunch Break**
Session II	**Moderator: Dr Ineke Malsch**
14:00-14:30	**Organiser´s Lecture: 60th anniversary of the International Science Programme at Uppsala University: a success story by colleagues and students in Africa, Asia and Latin America** *Prof. Carla Puglia & Barbara Brena, International Science Programme, Uppsala University, Uppsala, Sweden*
14:30-15.00	**Organizer´s Lecture: African Network for Solar Energy: 10 years after!** *Prof Daniel A. M. Egbe, ANSOLE e.V. Jena Germany/ Johannes Kepler University Linz, Austria*

15.00-15.30	**Invited Lecture: Defining side chain successions in anthracene-based poly(arylene ethynylene)-alt-poly(phenylene vinylene)s: probing structure–property relationships** *Dr Christoph Ulbricht, Johannes Kepler University Linz,Austria.*
15.30-16.00	**Invited Lecture: Development of Flexible and Sustainable All-Solid-State Supercapacitors for Wearable Electronics** *Dr. Achref Chebil, Center of Research on Microelectronics and Nanotechnology of Sousse, Technopark of Sousse, Tunisia*
16:00-16.20	***Coffee and Restroom Break***
Session III	***Moderator: Prof Maria Teresa Alarcon Herrera***
16:20-16:40	**Study and Application of Nano Anti-contamination for Photovoltaic Panels** *Dr. Khaled Belhouchet Mohamed Boudiaf University, M'sila, Algeria.*
16.40-17.00	**Performance Response to Ambient Parameters and Modelling of Polycrystalline Photovoltaic Module in Minna, Nigeria** Dr. *Joel Ezenwora*, Federal University of Technology, Minna, Niger State, Nigeria
17.00-17.20	**Growth and characterization of transition metal diselenides MSe_2 (M = Mo, W) for various applications** *Prof. Moussa Bougouma, Université Norbert ZONGO, Koudougou, Burkina Faso*
Session IV	***Poster Session moderated by Prof. Zahir Rouabah and Prof. Louiza Boudiba***
17:20-17:25	**An investigation on to the effects of buffer layer thickness and doping concentration on AlGaAs solar cell efficiency** *Prof. Lynda Benbahouche, University of Setif, Setif Algeria*
17:25-17.30	**Comparative study of two calculation models of solar radiation for a parabolic trough collector in Tlemcen, Algeria** *Loubna Benhabib, Abou Bekr Belkaid university, Tlemcen, Algeria*
17.30-17.35	**Removal of an azo dye by adsorption on a green algae (Ulva lactica)** Nasrine Benkhemkhem, *Université de Mostaganem (UMAB), Algeria*
17:35-17.40	**New fluoranthene-based compounds and their use in DSSCs** *Younes Bennacer, Université des Frères Mentouri de Constantine, Algérie,*
17.40-17.45	**Review on modeling and prediction of soiling effects on photovoltaic and concentrated solar power module performance** *Bouchra Laarabi, High College for Education and Research (ENS), Mohammed V University in Rabat (UM5R), Morocco*
17.45-17.50	**Optimization of metals analysis by volumetric method-the case of Ca(II), Mg(II), Zn(II), Mn(II), Cd(II), and Pb(II)** *Ryane Fassi, University Mentouri Brothers Constantine, Algeria*
17.50-17.55	**Experimental analysis and modeling of self-consolidating concrete (SCC) using waste glass** *Souad Tabet, Mohamed El Bachir El Ibrahimi University, Bordj Bou Arreridj, Algeria.*
17.55-18.00	**Study of a-Si:H hydrogenated amorphous silicon for photovoltaic applications** *Khadidja KETROUSSI, Université des Sciences et de la Technologie Houari Boumediene (USTHB), B.P. 32, El Alia, Bab Ezzouar, DZ-16111Alger, Algérie.*
18.00-18.05	**Effect of Sn concentration on the structural, optical and electrical properties of indium oxide thin films** *Ghemid Mouna, University of Science & Technology. (U.S.T.H.B), El-Alia, Algiers, Algeria.*
18.05-18.10	**UV radiation effect on optical and thermo-mechanical properties of PC/PS blend for BIPV application** *Imane CHARIF, University of Sciences and Technologies (USTHB), Algiers, Algeria*

18.10-18.15	**Experimental Investigation of Plant Extracts as Corrosion Inhibitor on Carbon Steel in Acid Solution** *Dr. Sameh Boudiba, , University of Larbi Tebessi, Tebessa, Algeria*
18.15-18.20	**Processing, characterization, mechanical and wear behaviours of magnesium reinforced aluminium alloys and nanocomposites: A review.** *Eng. Borisade S.Gbenga, Federal University Oye Ekiti, Nigeria*
18.20-19.00	**Celebrating ANSOLE & Closing remarks for the 1st day!**

Time: 8:30am-18.00 pm CET

Friday, February 5th

Zoom Link	**https://jku.zoom.us/j/93192161096?pwd=cUEzcGk1T3BRRG03MFE4UVF5VzBuZz09**
8.30-900	Access of participants to Zoom Room
8.45-9.00	*Opening remarks by Daniel A. M. Egbe & Samir Romdhane*
Session 1	***Moderator: Prof. Amel Romdhane***
9.00-10.00	**Keynote Lecture: Navigating the GREAT INDUSTRIAL TRANSFORMATION?** An Austrian Perspective for a **NEW** (GREEN) **DEAL between AFRICA and EUROPE** *Prof. Reinhold Lang, Johannes Kepler University Linz, Austria*
10.00.10.45	**Invited Lecture: Socially inclusive plastics recycling - a multi-year case study from Kenya** Markus Gall, *Johannes Kepler University Linz, Austria*
10.45-11.30	**Invited Lecture: NANOAFNET'S & UNESCO AFRICA NANOCHAIR'S R&D ACTIVITIES IN RENEWABLE ENERGIES** **Prof** Malik Maaza**,** *iThemba LABS-National Research Foundation, Western Cape Province, South Africa*
Session II	***Moderator: Carla Puglia***
11.30-12.00	**Universal access to safe drinking water: The helping hand of solar energy** *Prof. Chicgoua Noubactep, Georg-August-Universität Göttingen, Germany*
12.00-12.30	**Modeling and QSARs of thiosemicarbazide derivatives as corrosion inhibitor in acid medium** *Babatunde T. Ogunyemi, Federal University Otuoke, Bayelsa State, Nigeria*
12.30-13.00	**Invited Lecture: Controlling electrical and optical properties of polymer-fullerene bulk heterojunctions by precisely tuning the degree of polymer aggregation and phase separation from the fullerene** *Dr Christian Kästner, Technische Universität Ilmenau, Germany*
13.00-14.00	**Lunch Break**
Session II	**Moderator: Prof. Cherif Dridi**
14:00-14:30	**Invited Lecture: Improvement of donor crystallinity and phase separation in organic solar cells based on anthracene-containing PPE-PPVs** *Dr. Shahidul Alam, Friedrich-Schiller University Jena, Jena Germany*
14:30-15.00	**Invited Lecture: Influence of thermal annealing on the performance of bulk heterojunction polymer-fullerene solar cells based on AnE-PVab:PCBM** *Dr. Moufid Radaoui, University of Tunis El-Manar, Tunis, Tunisia*

15.00-15.30	**Invited Lecture: Organic Solar Cells for Agrivoltaics** Prof. Harald Hoppe, Friedrich-Schiller University Jena, Jena, Germany
15.30-16.00	**Invited Lecture: The key role of the electrolyte for the development of advanced electrochemical double layer capacitors** *Prof. Andrea Balducci, Friedrich-Schiller University Jena, Jena, Germany*
16:00-16:20	***Coffee and Restroom break***
Session III	***Moderator: Dr Christoph Ulbricht***
16.20-16.50	**Desalination: energetic aspect of desalination and coupling with solar energy.** *Prof. Sadok BEN JABRALLAH, University of Carthage, TUNISIA*
16:50-17.00	**Efficiency of Several Photochemical Methods for Decolorization of Cresol Red Dye present in water. Effect of solar light** *Soumia Fassi, University of Constantine, Algeria.*
17.00-17.10	**Development of new numerical platform for photoelectrical parameters extraction of hybrid nanocomposite based solar cells** *Elyes Bel Hadj Jrad, University of Sousse, High Institute Of applied sciences and technology of Sousse, Tunisia*
Session IV	***Poster Session moderated by Prof Martin Kamta & Dr Safae Aazou***
17.10--17:15	**Removal of "Bromocresol Purple" by direct photolysis and advanced oxidation processes (AOP's) in homogeneous solution under artificial and solar light** ***Ibtissem** Bousnoubra, University of Constantine 25000 Algeria.*
17:15-17:20	**Photovoltaic performance of rectangular and parabolic (In,Ga)N/GaN QW under applied electric field impacts,** *Hassan Abboudi, University of Mohamed Ben Abdellah, Fes, Morocco*
17:20-17:25	**Inhibition of Carbon Steel Corrosion in HCl and H_2SO_4 Solutions by Methyl 2-(1,3-dithiolan-2-ylidene)-3-oxobutanoate** Wafia Boukhedena, Larbi Tebessi University, Tebessa, Algeria
17.25-17.30	**Effect of ethyl acetate extract of *Taxus baccata* as an additive in electrodeposition bath.** *Karima Hanini, Tebessa University, Constantine Road, Tebessa-Algeria*
17.30-17.35	**Comparative study of the adsorption capacity of methyl orange (MO) by two anionic clays of the types $MgAlCO_3$ (R = 3) and $NiAlCO_3$ (R = 3).** *Salah Bahah, Université Bachir El Ibrahimi de Bordj Bou Arreridj.*
17.35-18.00	**Closing remarks and End of ANSOLE DAYS 2021**

Thursday, February 4th

From organic electronics towards bio-organic systems for CO_2 recycling

Niyazi Serdar Sariciftci
Linz Institute for Organic Solar Cells (LIOS), Physical Chemistry,
Johannes Kepler University Linz, A-4040 Linz, Austria
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Abstract

Organic photovoltaic cells are maturing from the academic research into the industrial development, entering the markets. Pure organic nanostructures and organic/inorganic hybrid nanostructures are comparatively studied for such devices. This talk gives an overview of materials' aspect and devices.

In order to account for a sustainable future, the application of biodegradable and biocompatible systems for organic optoelectronics are needed. The use of cheap electronic devices in a large scale will introduce a "consumable electronics" into the market of "consumer electronics". Therefore, environmentally friendly materials are important to use. This is a next great challenge to material science in organic electronics. New developments of bio-inspired and/or bio-origin, bio-compatible materials from our institute will be reported.

Last but not least the conversion of CO_2 to methane (or other synthetic fuels) using solar energy is an important step to make an efficient, large scale energy storage. At the same time this will make a cyclic and sustainable CO_2 economy. We report organic as well as bio-organic catalysts which can be used in photo-electro-catalytic conversion devices. Such bio-catalysts can be enzymes as well as living bacteria immobilized on electrodes. Selectivity of such bio-catalysts is very high and combined with the room temperature operation of such bio-electro-catalytic systems makes them industrially highly attractive.

Prof. Sariciftci is Ordinarius Professor for Physical Chemistry and the Founding Director of the Linz Institute for Organic Solarcells (LIOS) at the Johannes Kepler University of Linz/Austria.

He studied at the University of Vienna (Austria) and graduated as PhD in physics in 1989. After two years postdoctoral study at the University of Stuttgart (Germany) he joined the Institute for Polymers and Organic Solids at the University of California, Santa Barbara, USA, by Prof. Alan J. HEEGER, Nobel leaurate 2000 for Chemistry. His major contributions are in the fields of photoinduced optical, magnetic resonance and transport phenomena in semiconducting and metallic polymers. He is the inventor of conjugated polymer and fullerene based "bulk heterojunction" solar cells. Prof. Sariciftci published over 600 publications and with over 75000 citations he is one of the most cited scientists in material science (2011, Thompson Reuter ranking No: 14 of the world in material science). Google scholar ranks Sariciftci with an h-index of >119. Sariciftci has composed 8 books and educated several academic and industrial scientists. He also initiated seven spin off companies for organic optoelectronics. He is recipient of several prizes among them the National Science Prize of Turkey 2006 and the Austrian Scientists of the year Prize for Research 2008. He received the Medal for Humanity of the City of Linz 2009 and the Kardinal Prize for Science of the Archbishop in Vienna 2010. In 2012 he was awarded the prestigious Wittgenstein Prize of Austria. He is a Fellow of the Royal Society of Chemistry (FRSC), Fellow of SPIE, and member of several societies such as American Chemical Society, Materials Research Society, Austrian Chemical Society and Austrian Physical Society. He was selected as corresponding member of the Academy of Science in Austria (ÖAW). Sariciftci has been awarded honorary doctorate by the Abo Academy in Finland in 2011 and University of Bucharest in Romania in 2012. Sariciftci received the TÜBA Science Prize of the Turkish Academy of Sciences (2015) and was selected as member of the Turkish Academy of Sciences in 2017. He received the Selcuk Yasar University Prize for Advancement of Science and Humanity in Turkey in 2020.

Exploring ethical impacts of nanotechnology for water and sustainable energy

Ineke Malsch[1], Panagiotis Isigonis[2], Evert Bouman[3], Antreas Afantitis[4], Georgia Melagraki[4], Dalila Antunes[5], Maria Dusinska[3]

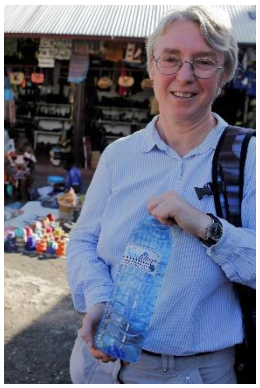
[1]Malsch TechnoValuation, Utrecht, The Netherlands, [2]UNIVE, Ca'Foscari University of Venice, Mestre-Venezia, Italy, [3]NILU-Norwegian Institute for Air Research, Kjeller, Norway, [4]Novamechanics, Nicosia, Cyprus, Factor Social, Caparica, Setúbal, Portugal

Abstract

Nanotechnology offers potential contributions to the Sustainable Development Goals 6 and 7: clean water and sustainable energy for all, the underlying objective of ANSOLE DAYS and BALEWARE 2021. However, the use of nanomaterials in innovative water treatment and sustainable energy solutions introduces ethical risks as well as benefits. In this presentation, we demonstrate the use of ethical impact assessment guidelines and tools (based on CEN Workshop Agreement part 2 CWA 17145-2:2017 (E)), developed in the RiskGONE project (https://riskgone.eu/) to support risk governance of nanomaterials on two case studies. In the first case study, nanotechnology is used for photocatalytic decontamination of wastewater. The second case study addresses the use of nanomaterials in solar energy. The presentation is relevant to the topics Wastewater Treatment & Solid Waste Treatment, and to the topic Solar Energy Materials and Devices.

Key words: nanotechnology, ethics, risk governance, wastewater, solar energy

Supported by the European Union's Horizon 2020 project RiskGONE, grant agreement no 814425.



Dr Ineke (N. H.) Malsch advises and writes about responsible development of emerging technologies in their societal context emphasizing a Do-It-Yourself Ethics approach. Education: graduated in physics (Utrecht University, 1991) and PhD in philosophy (Radboud University, Nijmegen, 2011). She has been involved in EU funded projects on responsible development of emerging technologies since 2002, and is currently engaged in the RiskGONE project www.riskgone.eu. She is also the Dutch contact person for the African Network for Solar Energy (ANSOLE), and has been a partner in the project NMP-DeLA, where roadmaps have been developed for nanotechnology for water, renewable energy and health applications in EU-Latin American cooperation. She has published articles and contributed to books for a variety of audiences including scientists, professionals and lay persons about ethical and responsible development of nanotechnology and other emerging technologies, including the book Future Technologies We Want (Wolf publishers, 2018).
Info: http://www.malsch.demon.nl/indexEN.htm and https://ethicschool.nl/en-gb/home

Underwater Solar Photovoltaics: Status and Pathway

Sanket Goel

MEMS, Microfluidics and Nanoelectronics (MMNE) Lab, Department of Electrical and Electronics Engineering, Birla Institute of Technology and Science (BITS) Pilani, Hyderabad Campus, Hyderabad, India

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Abstract: Energy harvesting in marine environments has tremendous scope for long-term power sources and sensor networks since the conventional battery-based power sources have many significant and known drawbacks. Due to land constraints, recent advancements in Solar photovoltaics (SPV) contribute to developing these systems on water bodies such as seawater,

lakes, canals, rivers, etc. In this context, leveraging SPV underwater lead to directly power autonomous underwater vehicles, sensors, water monitoring devices and remotely operated systems for defense and marine applications. In our recent studies, a lab-based experimental setup has been developed to investigate various kinds of commercial existing Solar cells, such as the monocrystalline, polycrystalline, and amorphous silicon Solar cells, for their utilization in diverse underwater conditions. These cells have been encapsulated with polydimethylsiloxane (PDMS) before testing them in underwater conditions. The behavior and performance of these cells have been analyzed with different types of water environments like deionized water (pure water), seawater, artificial seawater (with 3.5 % salinity) and lake water. The lake water consisted of bacteria, algae, and other water impurities. Also, rigorous experiments have been conducted to understand the response of these cells in water using multiple light sources such as the halogen lamp and xenon lamp, and various spectral ranges, blue-green, visible and infrared. This was due to the fact that while going deeper into the water, the spectral variations are prevalent due to the air-water interface of light. The outcomes of our work has manifested that the SPV has a significant potential to utilize in submerged conditions. Although there are certain challenges in utilizing silicon Solar cells underwater, due to suitable bandgap and spectral ranges, yet developing suitable materials can harvest the underwater Solar energy more efficiently. In summary, all these studies suggest that sufficient amount of Solar energy is available underwater, which can be harvested using SPV to power the marine environments with modern power electronic converters.

Sanket Goel is with the Department of Electrical and Electronics Engineering Department at BITS-Pilani, Hyderabad campus since 2015. Earlier, he the same department (2017-2020), and R&D department at the University of Petroleum & Energy Studies (UPES) (2011-2015). Sanket did his BSc (H- Physics) from Ramjas College, Delhi University; MSc (Physics) from IIT Delhi; PhD (Electrical and Computer Engineering) from University of Alberta, Canada in 1998, 2000, and 2006 respectively. He has worked with Institute of Plasma Research, Gandhinagar (2000-2001) and DEBEL-DRDO, Bangalore (2006). Sanket did his postdoc at Stanford University (2006-2008) and was a PI with ASTAR, Singapore (2008- 20011). His lab focusses on MEMS, Microfluidics and Nanoelectronics for Energy and Bio Applications, where he has been implementing several Indian and overseas funded projects. Sanket has won several awards, like Fulbright fellowship (2015), American Electrochemical Society's Best students paper award (2005) and University of Alberta PhD thesis award (2005). Sanket has >180 publications and 12 patents to his credits, and has delivered >70 invited talks and guided/guiding 25 PhD students. He is an Associate Editor of IEEE Transactions on NanoBioscience, IEEE Sensors Journal, IEEE Access and Applied Nanoscience. He is also a Visiting Associate Professor with UiT, The Arctic University of Norway.

Solar Calculations and Solar Radiation Power Evaluations using by Programming Languages, C Sharp Code and Python

Zuhal ER
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E-mail: erzuh@itu.edu.tr

Abstract

In early 2020, when the COVID-19 pandemic hit, renewable energy contributed just over a quarter of total global electricity generation. On the other hand, there is clearly the potential to increase this contribution and to further diversify the areas of application. With the widespread

use of phones among people, people spend a lot of time on the phone, and when we consider the fact that the charging of phones is an important energy requirement during the day, we are faced with the fact that solar energy, which is a renewable energy source, and solar radiation considerations, have a high place in life. Solar radiation information in KW-h / m2-year includes striking points in the context of the installation of solar systems at a location. In this text, it is known that the analysis of Solar Radiation Data for the location by integrating it into digital technological applications will make high contributions to system builders and operators and calculations are included. Based on these calculations, in this study, sunshine duration, solar angle calculations, solar constant correction factor, tilt angle, sunrise and sunset time, extra atmospheric and horizontal solar radiation values were calculated with C # programming code. The reasons for choosing the C # software language here are to create a Windows Application and I have been evaluating this application coding without any problems for the last 6 years. At the same time, calculations were made with python, and additionally, graphical analyzes were made from data sets. In this study, solar radiation data of Tunisia, Sousse were calculated and the results of Tunisia Sousse were presented in graphics using the obtained data. Considering the results obtained from this study, the examination of solar energy efficiency and production potential for the location will be presented, and examples from my previous studies in the literature will be presented in the context of making a comparison.

Keywords: Solar Radiation Power, Sun angles, Solar Irradiation, Solar Radiance, C Sharp Code, Python.

Zuhal Er is stuff in two faculties in ISTANBUL TECHNICAL UNIVERSITY (Faculty of Science and Letters, Physics Engineering Department (13b). 2019- and Maritime Faculty: Sea Transportation and Management Engineering Department 1996-2020, Department of Basic Science 2020-). She received her MSc degree in Nuclear Energy Institute (Istanbul Technical University-ITU-) in 1997 and her Ph.D. degree in 2005 from the Institute of Energy- Nuclear Research Program-ITU. She was also a visiting professor at the Maritime Academy of Australia (AMC) with a scholarship by the World Maritime Organization-IMO (2000).

Within the framework of research topics: Solar Energy Applications-Innovations and calculations, Solar Tracking Systems, Energy Efficiency, Risk Analysis, Ship Electricity-Electronics, Low-Level Natural Radiation Analysis and Ship Ballast Water Management (BWM), C Sharp and Python Programming Languages are working on these issues and integrating software with business-industry applications.

Three MSc theses are completed under her advising in the university. Two of them were successfully completed under her advisory during her academic member at Maritime Faculty in 2008. The theses were named "Analysis of Sea via LNG Transport in Turkey" and "LNG Transportation Risk Analysis and Safety Management Model". Since 2008, she has been working in the Department of Physics Engineering at the Faculty of Science and Literature, ITU. The other successfully completed MSc thesis had been under her advisory which it is titled ”New Model And Comparative Study of Factors with The Average Of Daily Global Solar Radiation", in the Department of Physics Engineering.

With the ITU JICA project, she conducted the installation of the Electrotechnic&Electronics Laboratory in the Maritime Faculty. She was the constructor of several courses such as Marine Electrotechnics, Ship Electric Machines that it had consisted of the Ship Generator Paralleling - Giving Engine Start Experiments - Motor Ahead/Reversing Experiments and some basic electronic

experiments with opportunities of this laboratory in ITU Maritime Faculty, to till 2008. Until now, she was a constructer of several courses such as Marine Electrotechnics, Marine Electric Machines, Marine Electronics and Physics (Mechanics, Electricity, Wave and Thermodynamic), Career Counseling, and Solar Energy Physics&Technology-I courses.
Zuhal Er is an author of the book chapter that is titled "Metal and alloy composites for neutron shielding", in MICRO AND NANOSTRUCTURED COMPOSITE MATERIALS FOR NEUTRON SHIELDING APPLICATIONS Edited by Sajith Thottathil Abdulrahman, Sabu Thomas, Zakiah Ahmad, Woodhead Publishing Series in Composites Science and Engineering, ISBN: 978-0-12-819459-1 (print) ISBN: 978-0-12-819462-1 (online) © 2020 Elsevier Ltd. All rights reserved.
Zuhal Er has many speeches/studies in several national/international conferences, seminars, symposiums, workshops, and in the SCI journals and other indexed journals too. She was one of the invited speakers in INCOSOLE, 2015. She is a reviewer&referee&guest editor in international/national journals and she is a scientific&organising committee member of the conferences, symposiums. Such as those: ICCESEN, 2014-till now; INCOSOLE, 2015; Environmental Engineering and Management Journal, 2012; International Journal of Computational and Experimental Science and Engineering (IJCESEN); International Journal of Nuclear and Radiation Science and Technology (IJNURASAT); International Journal of Engineering Science and Application (IJESA).
She is a member of the IEEE since August 2018. She is a senator of World Business Angels Investment Forum (2020). She is the inventor-ship of two patents (Patent No: 39616753-2017/E.2017-OE-387102 and Patent No: 10 2018 116 778.4). She is married and she has a daughter who is a medical doctor. She also has a target and aims in her life to do the best in future studies with the opportunities.

Functional Polymer Passivated Dye Sensitized Solar Cell Showing Exceptionally High Light-to-Current Conversion Efficiency

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Abstract:
Fiber shaped dye sensitized solar cells are very promising technology due to their light weight and flexibility making them suitable for use in military and textile applications. With the proper use of TiO_2, quantum dots, bulk heterojunction polymer layer and a liquid polysulfide electrolyte a high open circuit voltage of 0.75V has been achieved. The $TiCl_4$ annealing of the oxide layer resulted into a uniformly coated smooth but rough surface that facilitated efficient transfer of the photogenerated excitons. The chemical bath deposition technique was used to deposit different layers. A plasma sputtering system was used to fabricate the counter electrode. The photoelectric performance was evaluated at different cell length and a 3.5cm cell length gave the highest light-to-current conversion efficiency of 14.30%. When the cells were connected in series a high open circuit voltage of 1.5 V has been achieved. Future study can be conducted in this field to understand the role of a liquid electrolyte in obtaining high performance flexible solar cells.
Keywords*: Fiber Shape, Dye Sensitized Solar Cell, Liquid Electrolyte, Open Circuit Voltage.*

Dr. M. Jasim Uddin obtained his PhD degree (Materials Science) from University of Turin, Italy. He is currently working as an Assistant Professor in the Department of Chemistry, College of Science, University of Texas Rio Grande Valley. Prior to joining in University of Texas Rio Grande Valley; he worked at Tulane University, LA and Florida State University, FL. He discovered *Self-cleaning* and *antimicrobial* textiles during his doctoral research. He is recently awarded: Outstanding and Sustainable Research in Science Award 2016 (UTRGV), High Scholar Research Competition Award (First Prize) 2016 (UTRGV), United Group Research Award 2016 (International), NASA Texas Space Grant Award (2016), UGC Award in 2010 (International), etc.

Dr. Uddin's research focuses on functionalization of organic and inorganic nanostructured materials for advanced structural and energy application. We successfully bridged in between the graphene/MWCNT and conductive polymer, semiconductor nano phase etc. The modified structures are capable in harvesting renewable energy with three-dimensional feature and is applicable to be used as self-powered artificial muscle. We propose this self-powered muscle for Naval Vessel's Hull, with integrated energy conversion capability and ultra-strong and light weight-structural feature.

Concentrated Solar Thermal activities in The Thermal Process Laboratory Research and Technologies Centre of Energy (Tunisia)

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Concentrated Solar is among the solar thermal technologies devoted to meet the increasing energy demand and to diminish the use of fossil resources. We present our concentrated solar thermal activities at different scales and will describe the ongoing projects and research works for both power production and process heat.

AmenAllah Guizani (AG), is Professor of Physics at the Center of Research and Technologies of Energy since 2005, he is the Director of the Laboratory of Thermal Processes. His research activities focus on renewable energies and simulation of thermal processes. He has published more than 120 peer reviewed articles and is actively involved in international research projects related to renewable energy applications. Prof. Guizani has supervised more than 15 Doctoral Thesis in Physics.

Inverted Structure Solar Cell based on Nanofibers of Anthracene Containing PPE-PPV Copolymer: Limits and Challenges

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Abstract
There is a great demand for photovoltaics capable of harvesting solar light. In bulk heterojunction organic BHJ solar cells, a balance between the large interfacial area of both donor and acceptor constituent of the junction and domain size for charge transport with minimal recombination possibility is required. In this work, we thought of a nanofibers route to increase the interfacial area and control the active layer morphology through electrospinning technique. An Anthracene-containing Poly (p-phenylene-ethynylene)-alt-poly (p-phenylene-vinylene) (PPE–PPV) copolymer with a statistical distribution of octyloxy and 2-ethylhexyloxy side chains and accordingly donated AnE-PV*stat* is employed for the donor part, while phenyl C_{61} butyric acid methyl ester ($PC_{61}BM$) is used as the acceptor part. As (AnE-PV*stat:* PCBM) are not directly electrospinnable, we injected it to as a core material and **polycaprolactone (PCL) as a shell to form a core/shell structure. Subsequently, the PCL is washed out, and the resulted** (AnE-PV*stat:* PCBM) fibers are carefully characterized using SEM and HR-TEM and implemented in the fabrication of BHJ solar cells.

Keywords: Solar cell, polymer, nanofibers, high-power conversion efficiency.

Shaimaa Ali Mohamed is an Assistant professor at Zewail City of Science and Technology, Egypt. Shaimaa joined Zewail City as a research assistant and enrolled in her Ph.D. in 2012. She is then awarded the Africa-North Exchange Program (ANEX) fellowship, which allowed her to join Linz Institute for Organic Solar Cell (LIOS), Johannes Kepler University Linz, Austria. At LIOS and during her Ph.D. study, Shaimaa has been working on the design and fabrication of highly efficient quantum dots solar cells. Being able to secure travel support, she had the chance to present her research findings at many international conferences worldwide and to travel to different countries in Europe and Africa. Her academic contributions have yielded several peer-reviewed scholarly scientific publications, and awards including the Best Contribution Prize, Cape Town, South Africa 2013, Best Poster and Oral Prize, Summer School for Young Scientists on Renewable Energies in Africa, Arusha, Tanzania 2015, young research award, Thessaloniki, Greece 2015 and selected as the Best ANSOLE fellow for 2016. After receiving her PhD in 2015, Shaimaa continued her work as a postdoctoral fellow then an assistant professor at Zewail City of Science and Technology and currently teach different courses for undergraduate and graduate students. Her research work involves the design, fabrication, and characterization of different types of solar photovoltaic devices to realize highly efficient and low-cost energy sources. Besides, she has an interest in semiconductor technology, micro, and nanoelectronics fabrication at the cleanroom.

Concentrated sunlight-driven photocatalysis and green synthesis of Zinc Oxide nanostructures for sustainable water purification

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Abstract
The development of photo-catalysis systems based on natural and biocompatible elements promises valuable inputs for applications in water purification. The use of a natural, renewable, and economical source of solar energy for photochemical reactions in advanced oxidation processes (AOPs) combined with green-synthesized photocatalyst presents a major challenge for a cost-effective sustainable approach. Zinc Oxide (ZnO) nanostructures were prepared via a green synthesis method using plant extract of garlic bulbs (Allium Sativum), resulting in crystalline wurtzite nanorods (NRs) with an average diameter of ~30-40 nm and length between 100-200 nm. Each individual ZnO NRs has well-developed hexagonal facets, as confirmed by XRD, UV-Visible, FESEM, and EDXS analysis. For comparative studies, ZnO nanoparticles were chemically prepared by co-precipitation. A parabolic dish solar concentrator system was used for the photocatalytic investigation, providing a concentration of 870X in the focus [1]. The solar concentrator clearly also allows a higher density of UV radiation on the photocatalyst. The results showed that the bio-synthesized ZnO NRs exhibit a favorable photocatalytic activity for the degradation of the methylene blue dye (MB) during exposure to sunlight. Comparison with the chemically synthesized ZnO results in almost identical degradation of 94 % under optimum loading conditions. However this study paves the way for environmentally sustainable wastewater treatment solar processes using green photocatalysts.

Keywords: Environmentally-friendly synthesis, Zinc Oxide nanostructures, wastewater remediation, sunlight-driven photo catalysis.

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Asma El Golli is a third-year Ph.D. student in Engineering Physics in the Higher School of Sciences and Technologies of Hammam-Sousse at the University of Sousse, holding her research activity at NANOMISENE Laboratory, Center of Research on Microelectronics and Nanotechnology of Sousse, under the supervision of Professor. Chérif Dridi. Her thesis focuses on the concept of joining technologies and materials science with the aim of environmental sustainability. Her research will address key concerns about solar wastewater treatment based on nanomaterials. Before starting Ph.D., she holds a Research Master's Degree in Physics: Nanoscience and a Fundamental Bachelor's Degree in Physics, both from the Higher School of Sciences and Technologies of Hammam-Sousse. which has led her to her current doctoral work. More recently,

she also has been nominated as Representative of Ph.D. students on the Scientific Council of the CRMN. Email: elgolli.asma@gmail.com

60th anniversary of the International Science Programme at Uppsala University: a success story by colleagues and students in Africa, Asia and Latin America

Carla Puglia, Barbara Brena

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The International Science Programme (ISP) is a special unit that since 1961 has successfully [1] worked with low-income countries **to strengthen their domestic research capability** within the chemical, physical and the mathematical sciences.
The strengthening and building of post-graduated education and research capability are fundamental steps for the development of a knowledge-based society and for a sustainable fight against poverty, enabling people to improve their life conditions. ISP aims at creating sustainable research groups/networks working with projects of strong local ownership offering long-term and untied support.
This year, 2021, ISP is celebrating its 60th anniversary: I will present the events we are organizing in occasion of this celebration with the aim to build bridges among our groups and students, who make ISP a successful program.

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Carla Puglia is the Program Director of the Physics Programme at the International Science Programme (ISP) at Uppsala University, Sweden. ISP is a unit dealing with research capability building on low- and middle–low income countries in the basic sciences, Chemistry,Mathematics and Physics.
Carla Puglia is also leading a research activity at the Department of Physics and Astronomy (Uppsala University) focused on the development of deposition and characterization schemes of molecular materials. The aim of her research is to get control over the preparation/structure/functionality relation of molecular systems of increasing complexity, i.e. starting from single molecular building blocks and then combining them together in more complex molecular structures that have interesting properties to be implemented in organic electronics and solar cells. Her studies include spectroscopic characterizations of these molecules when isolated (gas phase) and when adsorbed in monolayer

and films on surfaces. This allows to follow the molecular electronic structure modifications induced by the increasing complexity and by the adsorption on a surface.

African Network for Solar Energy: 10 years after!

Daniel Ayuk Mbi Egbe

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Since its inception on the 4th of November 2010 in Sousse Tunisia and its official launching on the 4th of February 2011 in Linz Austria, the African Network for Solar Energy (ANSOLE) can look back with thankfulness and pride for its 10 years ´ achievements. We are thankful to God for His faithfulness to the network all through this first decade of our existence. He kept the door open in times of difficulties as He has promised in Revelation 3.8 "*… See, I have placed before you an open door that no one can shut…*) by putting on our path at the right time the right helping hands. His Word in Genesis 12.2 "I will bless you … and you will be a blessing…) has governed our activities and has led to life-changing achievements in diverse areas. We can humbly say that ANSOLE has been a blessing to Africans and to non-Africans over this period of time.…

Daniel Ayuk Mbi EGBE was born on 20th May 1966 in Mambanda-Kumba, South-West Region of Cameroon. He lost his mother at the age of 6, which forced him, as the youngest of 6 children, to move to Yato (Bomono) close to Douala, Littoral Region of Cameroon, to live with an aunt. While in Yato, he attended the Ecole Apostolique de Yato (a bilingual primary school) (1973-1976), then the Ecole Apostolique de Bekoko (1976-1977) and finally the Ecole Publique de Bomono-Gare (1977-1979), where he obtained the Francophone First School Leaving Certificate (CEPE) in June 1979 and passed the Francophone Common Entrance Exams (Concours d´Entrée en Sixième) for the Bilingual High School (Lycée Bilingue) of Molyko-Buea.

At Molyko he was privileged to be one of the few Cameroonians to attend the "tough Form 3 and Form 4 bilingual classes". He obtained the Francophone BEPC in 1983 with distinction, then the Francophone Probatoire C in 1985. In 1986 he was the only Cameroonian who succeeded in both Francophone Baccalaureat C and Anglophone GCE-Advanced Level (in 3 papers). Despite a preselection for a Cameroonian scholarship to study an engineering field in Britain and all efforts made to achieve this goal, destiny directed him to enroll at the then University of Yaounde (presently University of Yaounde 1), where he obtained his BSc in Physics and Chemistry (Organic Chemistry as major) in 1991 with honours. While in Yaounde he took German language classes at the Goethe-Institute from 1987 till 1990, and obtained 4 German language certificates and was able to spend 6 weeks intensive language course in Ludwigsburg Germany in the summer of 1988.

With the support of the German missionary family, Peter and Esther Schneider, of the Full Gospel Mission in Yaounde, he moved to Germany in October 1992, where he obtained a MSc (Diplom) and PhD in Chemistry in 1995 and 1999, respectively, from the Friedrich-Schiller University (FSU) of Jena. He was awarded the DAAD-Prize for the best foreign student at the FSU Jena in 1996. He completed his Habilitation in Organic Chemistry at the same institution in 2006. He is recorded as the first Cameroonian to complete a Habilitation in Chemistry in Germany!

From 2006 to 2008, he spent postdoctoral stays at the Max Planck Institute for Polymer Research in Mainz, Germany, the Technical University of Eindhoven in Holland, and at the Technical University of Chemnitz, Germany. In 2009 he moved to the Johannes Kepler University Linz, Austria, where was firstly member of the Linz Institute of Organic Solar Cells (LIOS) (2009-2016) before joining the Institute of Polymeric Materials and Testing (IPMT). Egbe's main research interest is the design of semiconducting materials for optoelectronic applications.

He is a member of Organic Electronics Association (OE-A), and a board member of the World University Service (WUS) in Germany. He is the initiator of the German-Cameroonian Coordination Office, initiator and International Coordinator of the African Network for Solar Energy (ANSOLE) (www.ansole.org), initiator and chairperson of ANSOLE e.V., an institution legally representing ANSOLE, and initiator of the Cameroon Renewable Energy Network (CAMREN). He also initiated and coordinates the research platform BALEWARE (Bridging Africa, Latin America and Europe on Water and Renewable Energies Applications) (www.baleware.org). His capacity building activities of ANSOLE have enabled him travel to many African countries, where he has co-organized more than 30 scientific events (in 16 countries) thanks to his ability to **bridge** people of different cultures and backgrounds.

From 2015 till 2017 he was member of the scientific council of the "Ecole Supérieure des Métiers des Energies Renouvelables (ESMER), in Benin. From 2015 till 2016 he was part of the team which developed research programs at the Pan African University Institute of Water and Energy Sciences (including Climate Change) (PAUWES) in Tlemcen, Algeria, an institution of the African Union.

Since 2015 he is an Independent Evaluator for the World Bank Group and African governments in the selection process of the African Centres of Excellence (ACEs) and African Host Universities (AHUs) with corresponding eligible students in the frame of PASET (Partnership for skills in Applied Sciences, Engineering and Technology)- RSIF (Regional Scholarships and Innovation Fund)- Programme.

In 2016 he was appointed the first Distinguished Brian O´Connell Visiting Fellow of the University of the Western Cape, South Africa, in recognition for his outstanding contribution in human capacity building in Higher Education in Africa.

He was initiator and director of the VolkswagenStiftung-sponsored Summer Schools on "Sustainable Energetics for Africa" (2015-2017). He is presently visiting lecturer/Professor at various African universities.

At the end of 2018, he was honored with the Africa Recognition Award 2018 by the African Community of Erfurt, capital city of Thuringia in Germany.

In 2020 he was elected board member of MigraNetz Thüringen e.V. (umbrella association of migrants´ organizations in the State of Thuringia in Germany) and representative of the African Continent at the Migrations -und Integrationsbeirat Jena (Migrants Council in Jena).

He has published till date more than 12**5** peer-reviewed articles in renowned journals and (co)supervised numerous international students from Africa and elsewhere. His publications have been cited more than 3**300** times and he has a H-index of 31. He speaks morethan 5 languages and is father of 4 children. He is a believing christian who enjoys dancing Salsa!

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Defining side chain successions in anthracene-based poly(arylene ethynylene)-alt-poly(phenylene vinylene)s: probing structure–property relationships

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Abstract
The optoelectronic characteristics of organic semiconductors generally arise from the layout of the conjugated system and can be modified by the introduction of substituents at the periphery, or metal centers at coordination sites. Besides facilitating solubility and processability, side chains can induce strong effects, too – structure, number and positioning can affect the alignment of a conjugated scaffold (torsion/planarization), the packing (π–π stacking, etc.), the orientation and the morphology in neat and in blended layers. Absorption and emission as well as electronic properties can be manipulated significantly.
Our endeavor to expand the configuration options of side chains in anthracene-containing poly(arylene ethynylene)-*alt*-poly(phenylene vinylene)s (AnE-PVs) resulted in a library of 9 polymers with diverse successions of octyloxy and 2-ethylhexyloxy chains. Therefor the synthesis of double dissymmetric functionalized phenylene building blocks was optimized and adapted. Despite the high structural resemblance of the comonomers as well as the polymers, side chain configuration-specific characteristics could be identified using NMR, UV-vis absorption and photoluminescence spectroscopy. The differentiation of the photophysical characteristics of the polymers induced by the various defined, semi-defined and random side chain sequences has been thoroughly investigated in solution and in thin film. The gained insights allowed substantiate our notions on the complex structure–property relationships in AnE-PV systems. This systematic study presents an illustrative example for the versatile but also intricate capabilities of side chain engineering.

Ref.: C. Ulbricht, N. Bouguerra, S. I. Ngi, O. Brüggemann, D. A. M. Egbe, *Polym. Chem.* **2019**, *10*, 5339-5347.

Christoph Ulbricht studied chemistry at the Friedrich-Schiller-University Jena with his diploma thesis on the synthesis and characterization of conjugated polymers. He obtained his PhD at the Eindhoven University of Technology working on the incorporation of phosphorescent iridium(III) complexes into polymeric systems. Postdoctoral research positions at the Johannes Kepler University Linz and at the University of Münster provided further insights into organic electronic materials and applications such as lithium-ion batteries, organic light emitting diodes and organic solar cells, inter alia.

Development of Flexible and Sustainable All-Solid-State Supercapacitors for Wearable Electronics

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Abstract
Smart textile (E-textile) presented a new type of fabric having a great potential for versatile applications in the fields of health monitoring displays, sensors, telecommunications devices, and generating/storing energy and so on. The widespread commercialization of E-textile is limited by the lack of energy storage incorporation since conventional devices such as batteries and supercapacitors are bulky, rigid and heavy. Therefore, it is compulsory to develop new energy storage generation integrated on textile and used in the garment industry to move away to another conjuncture: from conventional textile to technical one [1,2].
Carbonaceous based nanomaterials such as carbon nanotube, graphene, graphite, carbon black, fullerene and porous activated carbon display a versatile advantage like good electrical conductivity, high specific surface area, environmental friendliness and good mechanical properties. Therefore, they have been considered useful in different applications [3]. Contrasted to graphene, fullerene, and carbon nanotube needed a complicated and expensive process and instrument set-ups, graphene sheet-like activated carbon (GSAC) can be obtained via various biomass sustainable precursors. Moreover, the GSAC has been used in versatile applications such as electrodes fabrication for energy storage devices like supercapacitors and batteries [4].
The proof of this concept study give rise to an inspiration of comprehensive and effective utilization of biomass precursor to synthesize graphene sheets with a green, clean, and low-cost process and deposit it on textile to contribute to an affordable, reliable, sustainable and modern eco-friendly energy storage devices.

Keywords: Flexible Solid-state supercapacitor, Sustainable, E-textile, Green Nanotechnology

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Achref CHEBIL is a Doctor in Physics Engineering with a speciality in Nanotechnology. He studied at the Higher School of Sciences and Technologies of Hammam-Sousse at the University of Sousse-Tunisia. He is working at NANOMISENE Laboratory, Center for Research on Microelectronics and Nanotechnology of Sousse. His thesis focuses on the study and the development of flexible energy storage devices for autonomous microsystems.

Study and Application of Nano Anti-contamination for Photovoltaic Panels

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Abstract
In this paper, a novel application of a Nano-sized titanium dioxide photocatalyst for enhancing the performance of the photovoltaic panels is presented. The concept of cleaning solar panels using Nano coatings is proposed in this study to avoid the collection of fine particles, dust and water from the air above the solar panel that prevents sunlight from reaching the surface of the solar cell. The chemical and physical and properties of the TiO_2 thin film were analyzed and their influences on the self-cleaning were evaluated. In order to create self-cleaning property, the TiO_2 films were deposited on sample surfaces. The samples were exposed then, to the outdoor conditions tests. Simulations studies were carried out for two different cases; with coating and without coating. Test results showed that the as-prepared TiO_2-coated samples exhibited an improved self-cleaning ability of the excellent photo-induced catalytic performance of the TiO_2 film. These surface modifications have a significant impact in the reduction of dust accumulation and the loss of the transmission coefficient. This study shows that coating TiO_2 films on the surface of photovoltaic panels may have a promise in improving its performance in terms of temperature and efficiency. It can be effectively use the concept of Nano Anti-contamination self-cleaning of photovoltaic panels.

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Khaled Belhouchet joined M'sila University in 2015 as an Assistant Professor. He obtained then a Ph.D degree from the university of Setif, Algeria in 2020 . His research interests are: high voltage engineering, insulation technologies, optimization methods and overvoltage protection. He is a research member at the Automatic Laboratory of Setif (LAS), University of Setif, Algeria.

Performance Response to Ambient Parameters and Modelling of Polycrystalline Photovoltaic Module in Minna, Nigeria

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Outdoor characterisation and performance evaluation of Photovoltaic (PV) modules is needed for efficient PV power system. Outdoor assessment of polycrystalline silicon PV module was done in North Central Nigeria, using Campbell Scientific CR1000 software-based data acquisition system. The PV module under test and meteorological sensors were installed on a metal support structure at the same test plane. The data monitoring was from 08.00 to 18.00 hours each day continuously for a period of one year. Maximum value of module efficiency of 10.91 % for the module was recorded at irradiance of 375 W/m^2. At 1000 W/m^2 the efficiency reduced to 6.20 %, as against manufacturer's specification of 48 % for the module. The maximum power output achieved for the module at irradiance of 1000 W/m^2 was 1.323 W representing 13.23 % of the manufacturer's power specification for the module. Accordingly, Module Performance Ratio (MPR) for the PV module is 0.13. The rate of variation of module response variables with irradiance and temperature was determined using a linear statistical model given as $Y = a + bHg + c\,Tmod$. The coefficient of determination for the fits for the performance variables are: 69.1 %, 93.1 %, 62.4 % and 88.9 % for the open-circuit voltage, short-circuit current, power and maximum power respectively. The overall lack of fit tests for these performance variables is significant at probability, P value of 0.000, signifying good fits. The approach performed creditably as compared with measured data, therefore, it is resourceful.

Keywords (optional) Ambient; Module; Photovoltaic; Polycrystalline; Statistical-model

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Growth and characterization of transition metal diselenides MSe_2 (M = Mo, W) for various applications

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Abstract

The transition metal dichalcogenides (TMDs) such as $MoSe_2$ and WSe_2 have a layered structure and outstanding opto-electronic properties that make them useful for photovoltaic, photocatalytic, electronic, thermoelectric, chemical sensors and biosensors. In particular, $MoSe_2$ has been subject to many investigations since it was shown to have potential applications in solar energy conversion and hydrogen production. Besides, because of its possible use as 2-dimensional (2D) crystals obtained from 3D parent compound for application as nanoelectronics or optoelectronics materials, MoSe2 has been also subject of particular attention. In addition, some novel routes for $MoSe_2$ compounds synthesis such as, electrophoresis deposition (EPD), microwave treatment, hydrothermal reaction, chemical vapour deposition (CVD), and solvothermal reaction were also investigated. But, all of those researches usually consider single crystals as reference materials. Consequently, the growth of high quality single crystals is required as reference materials in the study of $MoSe_2$ for various kinds of applications. For instance MoSe2 single crystals were grown by chemical vapor transport using $TeCl_4$ as transport agent. After the growth, they were characterized by different physical, chemical and electrochemical methods. These characterization step demonstrated that single crystals were highly homogeneous and had good properties. After these characterizations, the materials were used for various applications including solar energy conversion, the detection of toxic gas molecules (NH_3), the synthesis of hybrid semiconductors for solar energy conversion and the synthesis of bipolar electrodes for chemical analysis.

Keywords (optional): Characterization, Crystal morphology, Single crystal growth, Transition metal dichalcogenides, Semiconducting materials, Solar cells

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Moussa Bougouma is currently the Director of the Faculty of Science at Norbert ZONGO University. Moussa Bougouma is also le director of the Materials and environmental chemistry laboratory.

An investigation on to the effects of buffer layer thickness and doping concentration on AlGaAs solar cell efficiency

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Abstract:

Recently, improving the performance of solar cells at a lower cost is imperative to enable the growth of photovoltaics in the global electricity mix. In addition, thin-film solar cells have large-scale terrestrial photovoltaic applications because of their low manufacturing cost. They have a considerable interest for space applications, tests of irradiation of protons and electrons.

In this context, the purpose of this article is to highlight the identification of the technological barriers currently facing the manufacture of thin-film photovoltaic cells based on arsenide gallium (GaAs) materials which are at the center of considerable development efforts because of their high conversion efficiency and potential for improvement in performance by focusing primarily on improving the electrical and quantum conversion efficiency of these solar cells.

To carry out this objective, a numerical study presented by a modeling and simulation aiming at the potential of the technologies of the materials used and the study of the performances of the solar cells whose aim of obtaining an optimal electrical conversion efficiency.

This interest for this materials is due to its interesting optical and electronic properties and to its various practical applications in solar cells, photovoltaic detectors, photovoltaic sensors and electronics. The main objective of this paper is the numerical investigation of the electrical characteristics, the efficiency and the form factor of an AlGaAs / GaAs heterojunction cell of the III-V family of semiconductors with through the Scaps software while highlighting the influence of physical and technological parameters, such as doping and thickness of the layers (AlGaAs, GaAs) to investigate the influence of these structures on the conversion efficiency.

Keywords : Solar cells, photovoltaic, Scaps,, AlGaAs/GaAs,

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Her research interests include, Photonics Device (Display, Photovoltaic), Reliability and Failure Analysis: Degradation studies PV, Solar cells made of silicon, CdTe, CIGS, organic materials,

Comparative study of two calculation models of solar radiation for a parabolic trough collector in Tlemcen, Algeria

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Abstract

The development of solar concentrator technology has just reached a very significant level. By using reflectors to concentrate the sun's rays on the absorber, this greatly reduces the size of the absorber, reducing heat loss and increasing its efficiency at high temperatures. Another advantage of this system is that the reflectors are significantly less expensive, per unit area, than the flat collectors. Their main disadvantage is that they only use direct solar radiation because the diffuse component cannot be concentrated. This is why the orientation of concentrators is relative to the direction of the propagation of direct radiation, this requires continuous tracking of the sun.

There are three main types of concentrators, the parabolic trough concentrators, solar towers and parabolic concentrators. The technology of parabolic trough concentrators is currently the most proven of the solar concentration techniques.

In this work, we developed a comparison between solar radiation values measured at the Tlemcen site and values estimated by theoretical models proposed in the literature by various researchers. The theoretical models chosen are the Capderou model, which serves as a reference for designers of solar systems in Algeria, and the new Bird and Hustrom model. The comparative study of the results obtained showed that the Capderou model is the one which presents the best estimate of the direct and diffuse components for any day of the year, whereas the Bird and Hustrom model is estimated only for clear days in particular for an incidence on the horizontal plane.

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Removal of an azo dye by adsorption on a green algae (Ulva lactica)

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Abstract

Our work has for objective the elimination of an azo dye: The Reactive Black 5 by adsorption on a biosorbent the green alga Ulva Lactica. The study of factors (time, pH) has shown that the best rates of elimination of the Reactive Black 5 dye are obtained for a time of 2 hours, and at an acid pH equal to 2.The adsorption isotherm of Reactive Black 5 is of type L and follows perfectly the Langmuir model with pseudo-second order adsorption

kinetics and that the maximum adsorption capacity of the green alga Ulva Lactica for the Reactive Black 5 is 21 mg/g.

Keywords : Biosorbent ; Adsorption ; Reactive Black 5 ; Ulva Lactica.

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New fluoranthene-based compounds and their use in DSSCs

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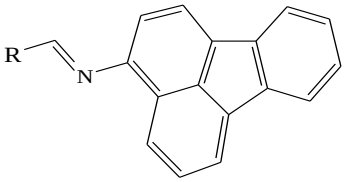
Abstract
The aim of this study is the synthesis of a series of new fluoranthene-based fluorescents compounds and their potential use in DSSCs. Their structure identifications have been done by IR and NMR spectroscopies and their optical properties have been revealed by UV-visible and fluorescence spectroscopies.



To use these compounds in DSSCs, some conditions must be checked optically and electrochemically. The three compounds are fluorophores that show two absorption peaks, the first in the ultraviolet and the second in the near ultraviolet. The optical gaps were estimated from the absorption thresholds. The electrochemical study carried out by cyclic voltammetry on a glassy carbon electrode shows almost similar behavior for the three compounds. The voltammograms obtained allowed us to calculate the energy values of HOMO and LUMO as well as the electrochemical gaps. Based on the values of the molar extinction coefficients, these molecules can be used as dyes in DSSCs. By having a good approximation of the values of their HOMO and LUMO, it becomes easier to conclude on their possible use as a dye in this type of device. The energy of the conduction band of the TiO_2 semiconductor is less than the energy value of the LUMO of our compounds. Moreover, the HOMO of the latter is lower than the oxidation potential of I^-/I^{3-} electrolytic couple. The results show that our products are good candidates for use as a sensitizing dye in DSSCs.
Keywords: DSSCs, dyes, cyclic voltammetry, HOMO, LUMO, Gap.

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Review on modeling and prediction of soiling effects on photovoltaic and concentrated solar power module performance

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Abstract

The effects of soiling on the performance of solar installations are a subject of rapidly increasing importance and interest. Many researchers around the world work on measurement, analysis, modeling and mitigation of these effects in order to make accurate yield predictions and develop optimal maintenance strategies. This, in turn, is important for risk and uncertainty reduction in large-scale investments. Many reviews of literature in parts of this broad field summarizing the state of the art and supporting researchers in further studies have been published. However, although modeling of soiling effects is addressed in a significant part of the studies published, no systematic review of this part of literature has been performed yet. The review work reported here is entirely focused on the modeling and prediction of soiling effect on PV (Photovoltaics) and CSP (Concentrated Solar Power) module performance. It aims at serving as a reference for future studies.

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Optimization of metals analysis by volumetric method-the case of Ca(II), Mg(II), Zn(II), Mn(II), Cd(II), and Pb(II)

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Abstract
In water treatment, analysis is an important step for evaluating the quality of raw and treated waters. Several methods can be used for metals analysis but they cannot be all available in the laboratories of water treatment plants. The aim of this study is the optimization of metals analysis by the simple volumetric method which requires available reagents. The analysis of Ca(II), Mg(II), Zn(II), Mn(II), Cd(II), and Pb(II) is undertaken using complexation reaction with EDTA. The effects of pH and indicator nature are evaluated. The detection limit is determined in each case.
The obtained results show that the analysis optimal conditions depend on the nature of the metallic cation. Eriochrome Black T is the best indicator for the analysis of Ca(II) at pH: 9.2, Mg(II) at pH:10 and both Zn(II) and Mn(II) at pH: 8.3. While murexide is more suitable for the analysis of Cd(II) at pH: 9.2 and Pb(II) at pH:10.

Keywords: metals analysis; complexation; EDTA; volumetric method

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Experimental analysis and modeling of self-consolidating concrete (SCC) using waste glass

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Abstract
Non-biodegradable waste, such as glass waste, presents a significant and growing environmental problem both nationally and internationally. One of the rare ways to recycle this waste is to reuse it in the concrete as a partial replacement for cement. Indeed, their

valuation presents several advantages: economic, ecological and technological. The main objective of this study is the development of an economic and ecological self-compacting concrete (SCC) containing glass powder (GP) as a cement addition. Following the Test Protocol, the SCC paste mixes are prepared with an E / L ratio of 0.38, cement dosage 400 kg / m^3 and 380 kg / m^3 and different percentages of replacement of cement by powder of glass, up to 14% by mass of cement. The analysis of the results obtained and the development of optimal formulas by the software of the "Design-Expert" experimental plan were carried out to better assess the effect of the glass powder on the rheology of cement pastes and on the performance of SCC in the fresh and hardened state.

Keywords: Self-compacting concrete, rheology, viscosity, glass waste, experimental design,

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Study of a-Si:H hydrogenated amorphous silicon for photovoltaic applications

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Abstract

The problem of increasing the light conversion efficiency of a-Si:H hydrogenated amorphous silicon devices has not been solved for decades **[1]**. In this work, we are trying to improve the photoconductive properties of a-Si:H(B) by studying the effects of circuitry and boron doping on a-Si:H(B) layers.

In this work, we studied a-Si:H intrinsic and doped films deposited by DC magnetron sputtering. To do this, a silicon target was sputtered into a DC discharge using an argon-hydrogen mixture. The substrate temperature is set at 300°C and the discharge power is 130 watts. These deposition parameters give a deposition rate of 4Å/s. the deposited layers are then thermally annealed at temperatures ranging from 300°C to 500°C in steps of 50°C.

Ellipsometry (SE) spectroscopic measurements were used to determine the optical parameters, which are the thickness and surface roughness of the deposited films. For electrical measurements, aluminum electrodes were evaporated on the samples deposited on the glass substrate in a coplanar configuration. The study of electrical properties consists of conductivity and photo-conductivity measurements that have been carried out at different temperatures.

Our results indicate that the increase in boron incorporation has induced an increase in the static refractive index ns and a decrease in the optical gap Eg.

The measurement of conductivity in the dark (σ_d) at 40°C showed a significant increase in conductivity by four orders of magnitude compared to layers made without introducing boron and the incorporation of boron in the silicon matrix is responsible for a reduction of the activation energy from 0.7 to 0.25 eV. Whereas undoped films have the best photoconductivity value with a sensitivity of about four orders. Thermal annealing did not significantly affect the optical and electrical properties of doped and undoped a-Si:H films. Then, undoped a-Si: H (B) films exhibit good thermal stability.

Our findings indicate that the undoped material is a good candidate for use in photovoltaic conversion.

Keywords: a-Si:H(B), sputtering, photovoltaic, electrical properties, ellipsometry.

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Effect of Sn concentration on the structural, optical and electrical properties of indium oxide thin films

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Abstract

Indium tin oxide, commonly called as ITO, is n–type semiconductor with wide band gaps 3.5-4eV. Consequently, ITO is transparent to visible-near-infrared and has low electrical resistivity. Because of these properties, ITO thin films have widespread optoelectronics application as electrode transparent conductor in solar cell, light emitting diode (LED), and TFT[1,2].

In this work, tin doped indium oxide (ITO) thin films have been deposited onto glass substrates by a sol–gel spin-coating process, followed by annealing in air at 500°C for 1 hour. The starting solution was prepared by mixing indium chloride dissolved in acetylacetone and tin chloride dissolved in ethanol. The content of Sn in ITO matrix was chosen 6% and 10%. The structural, morphology, optical, and electrical properties was investigated using X-ray diffraction (XRD), atomic force microscopy (AFM), UV-Visible spectrophotometry, and four probe points, respectively. XRD analysis was performed to study the crystallinity of the ITO films which showed that they were polycrystalline with a cubic bixbyite structure. The obtained result will be investigated and discussed.
As conclusion, funding result of combination transparent conductive in ITO thin films may be useful for thin film based solar cell application.

Keywords: ITO, sol-gel spin-coating, solar cell.

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UV radiation effect on optical and thermo-mechanical properties of PC/PS blend for BIPV application

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Abstract

Previous studies have shown that a good combination of architecture and structure design for energy production is key to achieving the goals of nearly zero energy buildings [1].
Due to the diversified properties of polymeric materials such as flexibility, excellent thermal insulation, and light management, photovoltaic panels are embedded in polymers providing new choices for the integration of solar systems into building as an alternative to traditional flat photovoltaic surfaces in Building Integrated Photovoltaic (BIPV), to enhance design freedom.

Due to sunlight, humidity, and oxygen in outdoor applications, several polymers undergo an aging process where chemical degradation reactions occur and affect their properties such as optical transmittance and its thermo-mechanical properties [2,1].
In this study, polycarbonate and polystyrene films were used as they are known for their transparency and their thermo-mechanical stability at ambient temperature, as well, they were used as their feasibility of application in a superstrate photovoltaic module design [3]. Films were blended by a solution casting method to prepare films of PC/PS 50:50 blend. To estimate the performance sustainability of the blend under real environmental conditions, films were exposed to ultraviolet radiations for different durations. The degradation process was probed using UV–Vis spectroscopy and dynamic mechanical analysis (DMA) to analyze their optical, structural, and thermo-mechanical properties.

Keywords Polycarbonate, polystyrene, BIPV, UV degradation, solar panel.

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Experimental Investigation of Plant Extracts as Corrosion Inhibitor on Carbon Steel in Acid Solution

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Abstract:
The environmental protection and care represent one of the most important current research topic. Regarding this aim, the use plant extract known to be the main source of secondary metabolites with their remarkable structural diversity and various activities, constitute an important eco-friendly alternative to inhibit corrosion. In order to do so, electrochemical and gravimetric methods were carried out to evaluate the corrosion inhibition efficiency on carbon steel API5L-X60 for various concentrations of plant extract against 1M hydrochloric acid solution at different temperatures. Apparent energies of the dissolution process were discussed. Higher inhibition efficiency for the studied extract was obtained at an optimum concentration. The

corrosion rate decreases with increase in different inhibitor concentrations and rises with temperature elevation.

Keywords: *Corrosion, Inhibition, hydrochloric acid, gravimetric method, electrochemical method.*

My name is **Sameh BOUIBA** and currently I am a lecturer of chemistry at the University of Larbi-Tebessi (Tébessa, Algeria) and a member of research laboratory of organic materials and heterochemistry located in the same university.

I earned my Bachelor of Natural Sciences and Life at Saadi-sedik high school in Tebessa in 1994 and my Midwife Diploma at national institute of public health, Constantine-(Algeria) in 1997. I had my Graduate degree in Physical Chemistry at Larbi-Tebessi University (Tebessa, Algeria) in 2006 and my Magister degree in Applied Organic Chemistry at normal higher college, Algiers (Algeria) in 2010. I made my PhD in Organic Chemistry from the University of Tebessa with the collaboration of Professor Daniel A. M. Egbe at Linz institute for Organic Solar Cells (LIOS), Johannes Kepler University Linz, Austria in 2017, working on synthesis, characterization and applications of polymers used in organic solar cells.
After completing my PhD, I focused my research on plants extracts employed as corrosion inhibitors and used as additives in electroplating to make my habilitation, which was heled on July 2019.

Processing, characterization, mechanical and wear behaviours of magnesium reinforced aluminium alloys and nanocomposites: A review.

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Abstract:
The needs for enhanced properties of steels based on requirement of light weight application have led to the development of aluminium reinforcements. In recent time, aluminium base metal matrix composites are considered as one of most potential material for structural and functional applications. Special Al alloys and composites are used in defence, aerospace, automotive, aviation, thermal devices for engine pistons, cylinders barrel, connection rods and elements of vehicles braking systems among others. This is due to their unique properties of high hardness, high strength, high stiffness, high wear, abrasion and corrosion resistance. To obtain the desired physical and mechanical properties like high hardness, high strength, high stiffness, high wear, abrasion and corrosion resistance, Al is alloyed or reinforced with variety of materials (metal, plastics and ceramics) to meet the needed properties. The next industrial revolution is associated with advantageous nanomaterials that combine the physical, mechanical and wear characteristics to achieve technological needs. In this respect, nanostructured magnesium-reinforced aluminium alloy and nanocomposites are best suited materials. This paper assesses some literatures available on the nanotechnology of magnesium base aluminium alloys and nanocomposites. The discussion centres on the processing methods, characterization, properties and applications with respect to the mechanical, thermal and wear behaviours of the developed magnesium-reinforced aluminium alloy and nanocomposites. Emphases are given to wear performances of the materials (dry and lubrication) and with respect to their usage at moderately/extremely high and low temperatures.

The review extends to the assessment of phase transformations, nanostructures, and interactions between the magnesium reinforcement, aluminium matrix and other elemental components.

Keywords: magnesium-aluminium alloy*; wear* behaviours; nanostructure; nanocomposites

Engr. **Borisade Sunday Gbenga** is a Lecturer in the Department of Materials and Metallurgical Engineering, Federal University Oye Ekiti, Ekiti State, Nigeria. He obtained his Masters and First degree in the area of production and mechanical metallurgy in 2018 and 2008, from Federal University of Technology Akure, Ondo State respectively. He belongs to professional and scientific societies such as council for the Regulation of Engineering Practice in Nigeria (COREN), member of International Association of Engineers and Professional Member of materials Society of Nigeria. He has supervised many undergraduate research works leading to award of B.ENG. He has to credit over 20 several articles published in international and national journals.

Friday, February 5th

Navigating the Great Industrial Transformation? An Austrian Perspective for a NEW (GREEN) DEAL between AFRICA and EUROPE

Reinhold Lang
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Content: Towards an all-renewable energy and all-circular Carbon economy and on the urgent need for a coordinated effort to establish a well-balanced cross-sectoral (energy & materials sector) and a level playing field cross-regional (Africa - Europe) collaboration. Specifically also adressed will be the pivotal role of a sustainable Circular Plastics Economy.

Professor Lang graduated in **1978** at the University of Leoben (A) with a Dipl.-Ing. degree in *Polymer Engineering and Science*, and he obtained a PhD degree in **1984** at Lehigh University (USA). He then joined BASF AG (D) from **1984 to 1991**, holding a research and group leader position in the field of advanced composites. In **1991** he became Full Professor at the University of Leoben (A). Acting also as Director of the Polymer Competence Center Leoben (PCCL) from **2002 to 2008**, he had a leading role in establishing and developing the PCCL to about 100 employees. Since September **2009** he holds the Chair of Polymeric Materials and Testing at the Johannes Kepler University (JKU) Linz (A), also heading the institute with the same name.

The research focus of Professor Lang is in the fields of *"Mechanics, Fracture and Fatigue of Plastics and Polymer Composites"* and *"Polymeric Materials & Sustainable Development"*. He is author and co-author, respectively, of more than 230 papers. In his role as initiator and coordinator of large,

multi-partner collaborative research projects (science and industry), he has successfully applied for and directed a publically funded research budget of about EURO 65 Mio. over the past 15 years. Thus, he currently acts as Project Director of the Austrian research project platform *SolPol*, focusing on polymer related innovations for solar technologies.

Socially inclusive plastics recycling - a multi-year case study from Kenya

Markus Gall*, Reinhold W. Lang

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Abstract
Plastic waste management remains a massive challenge all over the world. In the context of developing, low- and middle income countries, activities of waste management and recycling are often associated with informal work and inadequate handling and treatment leading to low-value output materials. In this presentation, an overview will be given about an ongoing multi-year case study on a plastics recycling company in Nairobi, Kenya. By means of a specifically developed business model, that company tries to integrate local waste pickers into a plastics recycling value chain that is oriented towards both social inclusion of marginalized human beings and quality output that is competitive in an international market environment.
Materials characterization by means of spectroscopic and thermo-analytical methods was used to elucidate the composition of informally sourced plastics recyclates. It could be shown, that a sophisticated combination of manual sorting and industrial-scale washing and treatment technology leads to levels of material purity that are comparable to those obtained from formal post-consumer waste management systems in Europe. Similar results were derived for basic material properties of such recyclates. Interview-based research revealed that direct interaction on a personal level between waste pickers and recycling company employees is crucial for trust building and stable supplier-buyer-relationships as well as for adequate material pre-sorting and overall input quality.
What remains is a number of sustainability challenges and questions that are yet to be answered. These range from the precise nature, degree, and permanence of improvements in working and living conditions of waste pickers, to issues of occupational and environmental health. With regards to environmental burdens, a specific focus has to be put on the question of sustainable energy sourcing and process water treatment and effluents including microplastics from industrial hot-washing and other recycling operations in future.

Keywords: plastics recycling, informal sector, waste picking, social inclusion

Markus is a polymer engineer with a specialization in materials science and a strong background in thermoplastics and advanced fiber composites. Currently, he works at the Institute of Polymeric Materials and Testing (IPMT) at the Johannes Kepler University Linz (JKU) in Austria. His main research focus is on material-structure-property relationships and quality aspects of mechanically recycled polyolefins. Complementary to that, Markus is interested in the wider context and the global implications of plastics recycling, the Circular Economy, and Sustainable Development. This is reflected in his work on informal recycling and policy making related to plastics. Contact via markus.gall@jku.at or on reasearchgate.net

NANOAFNET'S & UNESCO AFRICA NANOCHAIR'SR&D ACTIVITIES IN RENEWABLE ENERGIES

Malik Maaza

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•Africa's population is among the fastest growing and youngest in the world. Onein-two people added to the world population between today and 2040 are set to be African, and the continent becomes the world's most populous region by 2023, overtaking China and India. Hence, the energy supply within the African continent is a major if not the pivotal challenge. Electricity demand in Africa today is 700 terawatt-hours (TWh), with the North African economies and South Africa accounting for over 70% of the total. Yet it is the other sub-Saharan Africa countries that see the fastest growth towards 2040. Electricity demand more than doubles in the Stated Policies Scenario to over 1 600 TWh in 2040, and reaches 2 300 TWh in the Africa Case, with most of the additional demand stemming from productive uses and emerging middle- and higher-income households. In this regard, the preparation of a multiskilled workforce & emerging scientists in the energy sector & related fields is paramount.

•In line with the mission& vision of ANSOLE, this contribution reports on the Human Capital Development (HCD) & R&D activities of the NANOsciences African NETwork (NANOAFNET)[1] & the UNESCO Africa Chair in Nano (U2ACN2)[2] in renewable energy. More precisely, recent findings on selective solar absorbers for concentrated solar power applications [3], VO2 based thermochromic smart nanocoatings for green air conditioning applications[4], nanofluids as new coolants with enhanced thermal conductivity[5].

[1] https://nanoafnet.tlabs.ac.za/

[2]https://www.unisa.ac.za/static/corporate_web/Content/Colleges/CGS/schools,%20institutes%20&%20research%20chairs/research%20chairs/FINAL%20-%20Nano%20Report%205%20Years%201ste%20Term.pdf

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• Prof. **M. Maaza** is a native of North Africa, holds a PhD in wave-matter neutron optics from the University of Paris-VI, is the current incumbent, in South Africa, of the UNESCO UNISA-ITLABS-NRF Africa Chair in Nanosciences & Nanotechnologies (U2ACN2) and the chairman of the African Network of Excellence; the Nanosciences African Network (NANOAFNET). He Is a founding member of the African Network for Solar Energy (ANSOLE) and the African Laser Centre (ALC). He is a joint staff of the University of South Africa and the National Research Foundation of South Africa. He is a fellow of various Academies, including the African Academy of Science, the European Academy of Arts & Sciences as well as the National Academy of Science of India, the Islamic Academy of Sciences, & the Royal Society of Chemistry.Prof. M. Maaza has been bestowed several awards & accolade among which; the Galileo-Galilei award by the International Commission for Optics (ICO).

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Universal access to safe drinking water: The helping hand of solar energy

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Abstract

The affordability of appropriate decentralized solutions for safe drinking water provision in low-income communities rarely considers local labor. During the past 15 years, two distant and independent research groups have developed the science of self-reliance for safe drinking water provision. The first is based in the USA and collaborates with Thailand and the second is based in Germany and collaborates with Cameroon, Tanzania and Zimbabwe. This oral communication presents the second group using metallic iron as source of contaminant scavengers. The presentation is illustrated by the production of 2,000 L/d of treated water, the costs vary between about 1,500 and 12,000 Euro. A close look at the technologies reveals that expensive technologies use imported components or whole devices while do-it-yourself systems use local labor (less money expense). In the battle to achieve the United Nations Sustainable Development Goals for safe drinking water (SDG 6.1), such technologies, powered by off-grid energy systems, should be popularized.

Keywords: Safe drinking water, Decentralized solutions, Solar energy, Zero-valent iron.

Professor **Chicgoua Noubactep** studied chemistry at the University of Yaoundé, Cameroon, and received his Master of Science there based on "Drinking Water Treatment with Activated Carbons". He later earned his PhD from the University of Freiberg, Germany, for studies on groundwater remediation using metallic iron, and received his habilitation on "Metallic Iron for Safe Drinking Water Provision" from the University of Göttingen, Germany. Currently he is an associate professor there. Noubactep's research focuses on safe drinking water provision for households and small communities (e.g., rural), self-reliance in safe drinking water provision, and migration and mitigation of contaminants in the hydrosphere.

Prof. **Chicgoua Noubactep** has published more than 150 peer-reviewed articles. He is engaged in several non-governmental organisations (NGOs), including the Culture and Sustainable Development (CDD e.V.), Göttingen, Germany. Prof. Noubactep is the current mayor of the locality of Rittmarshausen in the administrative district of Gleichen (Landkreis Göttingen)
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Modeling and QSARs of thiosemicarbazide derivatives as corrosion inhibitor in acid medium

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Abstract
The effectiveness of six thiosemicarbazide derivatives as corrosion inhibitors were investigated using density functional theory and quantitative structural activity relationships approaches. Their potentials were determines using their estimated chemical descriptors such as electronegativity, hardness softness, dipole moments, softness, molecular weight, molecular orbital energy difference (ΔE), highest occupied molecular orbital energy (E_{HOMO}) and the lowest unoccupied molecular orbital energy (E_{LUMO}). Regression analysis was performed with ordinary least square method to develop a model that establishes relationship between corrosion inhibition efficiency and theoretical calculated chemical descriptors and also predict their corrosion inhibition efficiency theoretically. From the results, the predicted inhibition efficiencies are in agreement with

experimentally reported values with correlation coefficient of 0.998 and root mean square error (%) of 1.1158. Internal and external validation of the developed model indicates that the model is stable and robust with a good predictability.

Babatunde Ogunyemi is a lecturer in the Department of Chemistry, of the Federal University Otuoke, Bayelsa, Bayelsa State, Nigeria. He received the M.Sc. and Ph.D. degrees in Chemistry from the University of Ibadan, Ibadan, Nigeria. His research interest include computational molecular design and characterization of organic/inorganic molecules for solar cell, corrosion, molecular docking studies, gas-phase thermal decomposition of organic compounds and nonlinear optical properties of organic compounds.

Controlling electrical and optical properties of polymer-fullerene bulk heterojunctions by precisely tuning the degree of polymer aggregation and phase separation from the fullerene

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Abstract

It is common knowledge that the polymer conformation and its phase separation with fullerene derivatives are delicate issues, crucially impacting on the photovoltaic parameters of polymer based solar cells. Whereas strongly intermixed polymer:fullerene phases provide large interfacial area and consequently a high quantum efficiency of exciton dissociation, pristine and primarily ordered polymer and fullerene domains support efficient charge transport and percolation. To study the aggregation and phase separation behaviour in polymer solar cells we investigated two approaches: firstly the counterbalancing influences of polymer solution concentration and blending ratio with PCBM ([6,6]-phenyl-C61-butyric acid methyl ester) on the basis of a semi-crystalline anthracene-containing poly(*p*-phenylene-ethynylene)-*alt*-poly(*p*-phenylene-vinylene) (PPE-PPV) copolymer statistically bearing either branched 2-ethylhexyloxy or linear octyloxy side-chains (AnE-PV*stat*), and secondly the polymer:polymer blending ratio in ternary blends of a semi-crystalline and an amorphous polymer, bearing the linear octyloxy side-chains at the PPE-part and the branched 2-ethylhexyloxy at the PPV-part (AnE-PV*ab*) and vice versa (AnE-PV*ba*), with PCBM. We demonstrate by carefully choosing solution and PCBM concentration the control of polymer

aggregation, and by polymer:polymer blending ratio control of domain size evolution and phase separation. We explicitly demonstrate the counterbalancing effect on charge generation and transport for increasing polymer aggregation and domain purity, in agreement with theoretical considerations. Furthermore, the influence of polymer aggregation and phase separation on fundamental optoelectronic properties is discussed, providing detailed understanding of resulting photovoltaic parameters.

Christian Kästner studied engineering physics at the Technische Universität Ilmenau from 2002 till 2008. His Diploma thesis was about synthesis and characterization of endohedral metallofullerenes at the Leibniz Institute for Solid State and Materials Research, Dresden. He continued his research on endohedral fullerenes until 2010. From 2010 to 2014 he did his PhD on structure-property-relations of polymer solar cells at the Technische Universität Ilmenau. From 2015 till 2019 he did his Post-Doc in the field of thermal convection, from 2019 till 2020 on laser materials processing, both at Technische Universität Ilmenau. In 2021 he continued his research on thermal convection. Until today he is still active in data analysis of polymer solar cells and photoactive

Improvement of donor crystallinity and phase separation in organic solar cells based on anthracene-containing PPE-PPVs

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The bulk heterojunction morphology of organic solar cells widely controls their device efficiency and stability. Structural order and domain size of the donor phase strongly impact the charge separation efficiency, recombination rates, and the hole percolation through the bulk to the electrode. Herewith, we report a comprehensive study on the control of polymeric order already initiated in solution by the introduction of orthogonal solvent additives to the common solution of anthracene containing poly(p-phenylene-ethynylene)-alt-poly(p-phenylene-vinylene) (PPE-PPV) copolymer, bearing statistically substituted linear octyloxy and 2-ethylhexyloxy side-chains in 1:1 ratio along the backbone (AnE-PV*stat*), and fullerene derivative phenyl-C61-butyric acid methyl ester (PCBM).

Dr. Shahidul Alam received his B.Sc. degree in Physics from University of Chittagong, Bangladesh. He obtained his M.Sc. degree in Electronics Engineering from Bremen, Germany. During his master's studies, he worked on organic electronics in Prof. Wagner group at Jacobs University Bremen. After that, he worked as a research intern at Next-Energy, EWE- Research Centre for Energy Technology at Carl von Ossietzky University Oldenburg, Germany. In 2013, he moved to Ilmenau University of Germany and worked in a project funded by Deutsche Forschungs Gemeinschaft (DFG). In 2015, he joined Prof. Schubert's group at the Center for Energy and Environmental Chemistry (CEEC), Friedrich Schiller University (FSU) Jena. He received his Ph.D. in 2020 from the Faculty of Chemistry and Earth Sciences, Friedrich Schiller University (FSU) Jena under the supervision of PD. Dr. Harald Hoppe and Prof. Dr. Ulrich S. Schubert. Currently, he is working as a postdoctoral fellow in CEEC Jena, and his research interest is charge transport in organic semiconductors, device performance, and stability of solution-processed polymer solar cells.

Influence of thermal annealing on the performance of bulk heterojunction polymer-fullerene solar cells based on AnE-PVab:PCBM

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The most highly efficient OSCs to date have been focused on blends of polymer fullerenes in which fullerenes such as phenyl-C61-butyric acid methyl ester (PCBM) serve as electron acceptor. Here, we present the current density-voltage (J-V) characteristics and cole-cole impedance plots (-Im(Z) vs Re(Z)) of ITO/PEDOT: PSS/AnE-PVab:PCBM/Ca/Ag solar cell were measured under thermal annealing range 25°C-125°C using AM1.5 G solar simulator. The fill factors (FF), the short-circuit current density (J_{SC}) and the open-circuit voltage (V_{OC}) initially increased up to 110°C and then decayed considerably for higher annealing temperatures. Under short circuit conditions at 0V DC, the Cole-Cole plots demonstrate an increase in the semicircle radius for devices annealed at 25°C and 100°C. Then, the semicircle radii decrease with increasing annealing temperatures from 105 °C and above. However, at V_{OC} conditions, we observe that the semicircle radii increase with increasing the thermal annealing. To reproduce theoretically the observed cole-cole impedance plots at 0V DC and V_{OC} conditions for different annealing temperatures, we used an equivalent circuit in the framework of the transmission line model, incorporating the chemical capacitance (C_μ), the recombination resistance (R_{rec}), the transport resistance (R_t) and the contact electrical resistance (R_{CO}). We determined the diffusion time (τ_{rec}), the recombination time (τ_{dif}), the diffusion length (Ln) at 0V DC and V_{OC} voltages [1]. At V_{OC} voltage, average mobility of global carriers for the device is around 4 10^{-3} $cm^2V^{-1}s^{-1}$ which is in good agreement with that derived using PCBM electron-only devices.

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Organic Solar Cells for Agrivoltaics

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Abstract:
Over the last few years organic solar cells experienced remarkable progress in terms of power conversion efficiency: based on the development of novel non-fullerene acceptors performances of up to 18% were recently reported. Nowadays, agrivoltaics is receiving more and more attention for dual use of land. With classical photovoltaics several symbiotic relationships between photovoltaics and agriculture have been realized, in which shading due to the photovoltaic installation was even beneficial for some type of plants, whereas in other cases shading could be minimized. With organic photovoltaics, thanks to their ability to absorb light in rather narrow absorption bands, even transmission of the for plant growth required spectral range of about 350 – 700 nm appears feasible. Based on novel material developments, organic solar cells restricted to using sunlight within the range of roughly 750 – 1200 nm could be realized. Such devices could be used in green houses or so-called polytunnels for efficient symbiotic use of the light. In addition, such constructions are interesting for minimized requirements of irrigation and added value due to the PV-power becoming locally available.

Harald Hoppe received his PhD in 2004 from the Johannes-Kepler-University Linz, where he started his work in organic photovoltaics (OPV) by investigation of material and phase morphologies within organic bulk heterojunction blends and their impact on device properties. Thereafter he built up a research group at Ilmenau University of Technology. In 2015 he joined the Friedrich-Schiller-University of Jena at the Center for Energy and Environmental Chemistry Jena (CEEC Jena). His current research interests are materials and strategies for improved solution processing, device performance and long-term stability of OPV, as well as imaging methods for offline and inline inspection.

The key role of the electrolyte for the development of advanced electrochemical double layer capacitors

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Abstract

Electrochemical double-layer capacitors (EDLCs) are nowadays considered among the most important energy storage devices [1-4]. EDLC are characterized by high power densities (ca. 10 $kW \cdot kg^{-1}$), long cycle-life (> 500.000 cycles) and have a superior efficiency especially for short-term use (discharge time of some seconds to minutes) compared to commercially used Lithium-Ion-Batteries (LIBs). In EDLCs the energy is stored through a physical process -the double-layer formation- occurring at the surface of the electrodes. This process, although guarantee high power, is limiting the energy of these devices and EDLCs can only provide about a tenth of the energy density of batteries, which are devices relying on a chemical storage process taking place in the bulk of the electrodes.

Activated carbon are the most used electrode materials in EDLCs, while the state-of-the-art electrolytes are based on organic solvents (propylene carbonate (PC) or acetonitrile (ACN)) with asymmetric quaternary ammonium conductive salts (mostly tetraethylammonium tetrafluoroborate (Et_4NBF_4). This electrode-electrolyte combination allows operative voltages in the order of 2.8-3.0 V [1-4].

Several studies indicate that if the energy of EDLCs would increase from the actual 5-8 $Wh \cdot kg^{-1}$ to 12-15 $Wh \cdot kg^{-1}$, the number of applications, and thus the market, of these devices would increase dramatically. Consequently, great efforts have been dedicated toward the realization of high voltage EDLCs, and it has been shown that one of the most effective strategies to achieve this goal is to realize high voltage systems. Since the state-of-the art electrolytes are not suitable for the realization of stable high voltage EDLCs, the search and development of innovative electrolytes is essential for the future of the EDLC´s technology [1-4].

In this lecture the identification and the chemical physical characterization of novel electrolytes suitable for EDLCs will be will be considered and critically analysed. The impact of these novel electrolytes on the electrode materials will be discussed. Furthermore, the influence of these electrolytes on the dynamics of detrimental processes occurring at high potentials will be considered.

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Desalination: energetic aspect of desalination and coupling with solar energy.

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Abstract
The freshwater resources in the world, responding to population growth and increasing human needs become insufficient and are increasingly threatened by any kind of pollution. To solve this problem of shortage of drinking water sources, we often use desalination.
Desalination processes have a remarkable development. However, they still remain major consumers of energy. Much of the cost of desalinated water is defined by the price of energy. To reduce energy costs, the coupling of desalination with renewable energy, particularly solar energy, was studied. Studies have shown the feasibility of this coupling.
We present the different desalination processes with emphasis on the energy aspect. Then we present the coupling with solar energy. For these processes, we discuss the performance of desalination plants that run on solar energy. We study the production limits of these plants.

Keywords: Desalination, Solar energy, Coupling, production.

Sadok BEN JABRALLAH, born in 1958, is a professor at the University of Carthage. Co-founder of the Laboratory of Energy and Thermal and Mass Transfers, he leads a research team entitled "Transfers, Flow and Phase Change", whose activities relate to:

- Thermal
- Phase change: Solid-liquid (MCP) and liquid-vapor (evaporation-condensation)
- Solar desalination

Professor Sadok BEN JABRALLAH, has been working on solar desalination for several years. He coordinated several projects in this field, including a federated national project to study the feasibility of solar desalination in Tunisia.
Professor Sadok BEN JABRALLAH has launched a master's degree in air conditioning, which he coordinates.

Efficiency of Several Photochemical Methods for Decolorization of Cresol Red Dye present in water. Effect of solar light

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Abstract
The feasibility of employing different photoxidation systems, like: Fenton, Fenton /UV and Fenton/solar light in the decolorization and mineralization of an cationic dye, has been investigated.The aim of this study is to test some advanced oxidation techniques (AOTs) in the absence of light (Fenton) and in its presence (photo-Fenton) to obtain total decolorization of dye in aqueous solution: the Cresol Red (abbreviated as CR). Experiments were conducted on a laboratory scale set up with all these processes.
Batch experiments were carried out to evaluate, on the first stage, the influence of different processes on CR decolorization. During the second stage were investigated the optimal operational conditions of Fenton,Fenton/UV and Fenton/solar light processes, like pH, H_2O_2

dosage, iron dosage, RC concentration and source of light. The experiments indicate that CR can be effectively decolorized using Fenton/UV and Fenton/solar light processes with a small difference between the two processes, 98.1% and 83.2%, respectively, after 30 min. This improvement could be related to a better production of radicals OH^{-}. Although there is lesser difference in dye decolorization, significant increment in COD removal was found with Fenton process (26.4% COD removal) relative to Fenton /UV and Fenton/solar light process (56.2% and 39.6% COD removal) respectively. This fact reveals that UV-C low-pressure mercury lamp although with its small effect on dye decolorization is particularly important in dye mineralization, when compared to solar light. However, Fenton/solar light system shows large potential on photochemical treatment of textile wastewater with particular interest from the economical point of view.

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Keywords: Advanced oxidation process, CR, Water; UV, Solar light

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Development of new numerical platform for photoelectrical parameters extraction of hybrid nanocomposite based solar cells

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Abstract

This work proposes a combined physical-numerical approach based on simulation, modulation and optimization procedures to overcome solar cells issues such as complex conversion and charge transfert mechanisms, in particular, for solar cells based on new innovative nanomaterials. The developed method is simple, efficient and does not support certain parameters such as open circuit voltage (V_{co}) or short-circuit current (I_{cc}). It can be applied for incomplete and undefined curves but requires in return a good choice of initial parameters.

In this work, the Lambert-W function [1] was used to provide explicit analytical solutions of the current I. The applied numerical method is based on the Nelder-Mead Simplex modified algorithm. The optimization aims to find five parameters which minimize the objective root mean square Error (RMSE) function [2]. The main objective of this paper is to present a new, simple and efficient numerical method for extracting the ITO/PEDOT:PSS/P3HT:SiNW/Al hybrid solar cells electrical parameters before and after undergoing chemical surface treatments in a fixed concentration of silicon nanowires (SiNWs). In order to verify the accuracy of the applied algorithm, the method was tested on NRs-ZnO based solar cells and exposed better fitting curves and more accurate results comparing to the published literature [3] of our team. In addition, the method has shown

low values of RMSE of the order of 10^{-4} for the PSS/P3HT: SiNW solar cell under different chemical treatments. The founded results have proven that the used chemical modifications were able to improve the photovoltaic performance of the cell by decreasing the series resistance R_S, the ideality factor n and the saturation current I_S, also by increasing the photocurrent I_{PH}.

This work was supported by the Tunisian Ministry of Higher education and scientific research for financial support.

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My Name is **Elyes bel hadj jrad**, I'm holding a master degree of research in electronics microsystems at the higher institute of applied sciences and technologies of Sousse. I am currently a PHD student in physics engineering at the Centre for Research on Microelectronics and Nanotechnology of Sousse (NANOMISENE laboratory). My thesis focuses on the study and development of energy sources, in particular supercapacitors based on green nanotechnology, using simple and low-cost techniques.

Removal of "Bromocresol Purple" by direct photolysis and advanced oxidation processes (AOP's) in homogeneous solution under artificial and solar light

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Abstract

The phototransformation of Bromocresol Purple (BCP, anionic structure), a well-known non-biodegradable dye has been studied using photolysis /UV, photolysis/ Solar and advanced oxidation processes (AOPs) such as: H_2O_2/UV, H_2O_2/ Solar, $S_2O_8^{2-}$/UV and H_2O_2 / $S_2O_8^{2-}$ / UV. The obtained results showed that the elimination rate of this compound has been faster with H_2O_2/UV and $S_2O_8^{2-}$ /UV than with H_2O_2 / $S_2O_8^{2-}$ / UV and direct photolysis/UV or photolysis/ Solar. The percentages of degradation by H_2O_2 / UV, $S_2O_8^{2-}$/ UV and $S_2O_8^{2-}$/ H_2O_2/UV are respectively 100 %, 99.08 % and 90, 36 % for a reaction time of 30 minutes. This feature may be explained, in one part by a competition of the emitted light between H_2O_2 and $S_2O_8^{2-}$ which may slow down the production of the two radicals and in another part by a difference of reactivity of $HO^{\bullet}$ (occurring without discrimination) and $SO4^{\bullet-}$(occurring with a great selectivity). The influence of parameters such as the amount in dye, in H_2O_2 and $S_2O_8^{2-}$ has allowed situating the efficiency of these techniques. Thus, an increasing of the concentration in dye has retarded its elimination by direct UV photolysis whereas its elimination with H_2O_2 and $S_2O_8^{2-}$ has been accelerated. The efficiency of substrate decolorization

and mineralization in each process has been comparatively discussed by decreases in concentration and total chemical oxygen demand content of BCP solutions. Decolourization kinetic followed the pseudo-first-order for all systems.

Keywords: Decolorization, BCP, mineralization, solar irradiation, water.

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Photovoltaic performance of rectangular and parabolic (In,Ga)N/GaN QW under applied electric field impacts

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Abstract

In this work, we were interested on the photovoltaic conversion performance of $GaN/In_{.2}Ga_{.8}N/GaN$-quantum well with intermediate single-band solar cell embedded in the intrinsic region of standard p-i-n photodiode. Rectangular and parabolic quantum wells are considered. Time-independent impurity-related Schrödinger's equation is handled using the finite difference method. Different quantized electrons and holes discrete eigen-energies and eigen-functions were calculated, and subsequently the width and position of the single intermediate band. Optical energy transitions are obtained for different structure size and electric field considering the heavy hole generally neglected in similar studies. The open-circuit voltage, current density and photovoltaic efficiency are numerically calculated. Our results show that optimizing the solar cell performance can be obtained by average structure size and electric field adjusting.

Keywords : InGaN, Electric field, QW, Rectangular, Parabolic

I am **HASSAN ABBOUDI,** born February in Morocco in 1970. I got my bachelor's degree in theoretical physics in 1995 at the Faculty of Science in Meknes. In 2000, I was a high school physics and chemistry teacher at Missour High School. And since 2009, I have been in charge of the physics-chemistry practical work at the Moulay-Idriss Fes preparatory classes center. I got a second bachelor's degree in solid state physics at the Faculty of Science Dhar Elmahraz Fez in 2016, then a master's degree in the physics of nanomaterials for renewable energy in 2018 at the same Faculty. Since 2019, I am registered at the doctoral study center at the same Faculty, and I work on nanomaterials III-Nitride Semiconductors for solar cells.

Inhibition of Carbon Steel Corrosion in HCl and H_2SO_4 Solutions by Methyl 2-(1,3-dithiolan-2-ylidene)-3-oxobutanoate

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Abstract

The adsorption behaviour of Methyl 2-(1,3-dithiolan-2-ylidene)-3-oxobutanoate (MDYOB) on carbon steel and its inhibitive action on corrosion in 1 M HCl and 0.5 M H_2SO_4 aqueous solutions were examined using different corrosion evaluation methods, such as weight loss, potentiodynamic polarisation and electrochemical impedance spectroscopy. The results obtained showed that the inhibitory character of this product increases with the concentration but this character is inversely related to the temperature. Tafel curves have revealed that this compound (MDYOB) possesses the indices of a mixed inhibitor. The inhibiting effect of this compound was interpreted through its adsorption on the metal surface. The Langmuir isotherm adequately describes the process of adsorption of the MDYOB molecules on the surface of the steel in this medium. The experimental results revealed that MDYOB restrains the corrosion reaction in both acidic environments, the inhibition efficiency being stronger in H_2SO_4 than in HCl. The discussion of kinetic and thermodynamic parameters such as activation energy, enthalpy, entropy and adsorption free energy has also been the subject of this work. Quantum chemical parameters were calculated and discussed.

Keywords Corrosion inhibitor · Carbon steel · Acidic media · Methyl 2-(1,3-dithiolan-2-ylidene)-3-oxobutanoate · Density functional theory

I am named as **Wafia Boukhedena**, currently I am a lecturer of chemistry at the University of Larbi-Tebessi (Tébessa, Algeria) and a member of research laboratory of Mines located in the same university. I earned my Bachelor of Natural Sciences and Life at Zigoud Yousef high school (Constantine-Algeria) in 1992 , I had my Graduate degree in Chemistry at Mantouri University (Constantine, Algeria) in 1996 and my Master degree in Analytical Chemistry and Physics at the same University in 2001. I made my PhD in Analytical Chemistry from the University of Mantouri University (Constantine I, Algeria) in 2018, working on synthesis, characterization and

applications of organic compounds and in corrosion field. After completing my PhD, I focused my research on plants extracts employed as corrosion inhibitors.

Effect of ethyl acetate extract of *Taxus baccata* as an additive in electrodeposition bath

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Abstract

The aim of this work is the evaluation of ethyl acetate extract obtained from the aerial part of "*Taxus Baccata*" as additive in electrodeposition using potentiodynamics polarization and weight loss measurements. The electrodeposition of the zinc on the steel in chloride solution was performed using a direct current supply. The presence of the ethyl acetate extract as additive in the electrolytical bath performed the quality of the electrodeposition of the zinc. This constatation was observed through the deposit parameters as the brightness, the adhesion and the thickness. It was found that the electrodeposition process changed with additive concentration. In addition, their efficiency against corrosion was evaluated indicating that the samples coated in the presence of the extract were more resistant against this phenomenon.

Keywords: *Corrosion*; *Taxus Baccata*; *electrodeposition*; *extract*; additive.

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I earned my Bachelor of Exact Sciences at Saadi-sedik high school in Tebessa in 1998. I had my Graduate degree in Chemistry at Larbi-Tebessi University (Tebessa, Algeria) in 2002 and my Magister degree in materials sciences at Mohamed Khaider University, Biskra (Algeria) in 2005. I made my PhD in Organic Chemistry from the University of Tebessa in 2020, working on plants extracts employed as corrosion inhibitors and used as additives in electroplating.

Comparative study of the adsorption capacity of methyl orange (MO) by two anionic clays of the types $MgAlCO_3$ (R = 3) and $NiAlCO_3$ (R = 3).

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Abstract : The application of synthetic adsorbents for water treatment is one of the ways used by several scientific studies to find out the efficiency of the elimination of dyes in water by these types of anionic clays. $MgAlCO_3$ et $NiAlCO_3$ (R=3) are clays synthesized in the laboratory by the direct co-precipitation method. To characterize these clays, several techniques were used, DRX, FTIR and BET. The XRD diffractograms and the FTIR spectra respectively indicate the presence of all the peaks and the functional groups which characterize the clays studied. BET analysis shows specific surfaces of the order of 61.50 (m^2 / g) and 66.86 (m^2 / g) for $MgAlCO_3$ (R = 3), and $NiAlCO_3$ (R = 3), respectively. In addition, we have studied the adsorption of MO by these clays, where the adsorption of MO in solution on the two clays is successfully modeled by the Langmuir, Freundlich models where the adsorbate concentration is the only variable. Based on the coefficients of the regressions (R^2), we find that the adsorption of MO follows the Langmuir model. Methyl orange adsorption capacity which was determined by the Langmuir isotherm is 47.61 mg • g^{-1}, 21.27 mg • g^{-1} for $MgAlCO_3$ (R = 3), and $NiAlCO_3$ (R = 3) respectively. According to the MO adsorption kinetics curves, equilibrium is attained after 10 min for the two clays studied. The models of MO adsorption kinetics on the studied supports are the pseudo first order and the pseudo second order. The most suitable model to describe the adsorption kinetics of MO is that of pseudo second order.

Keywords: Anionic clays, Methyl orange, Adsorption, Langmuir, Freundlich.

Other Biographies….

Professor **Samir Romdhane** is member of the Laboratory of Advanced Physics and Quantum Phenomena Faculty of Sciences of Tunis, Tunis,Tunisia. He was born on April 24, 1966. Samir Romdhane studied physics at the Faculty of Sciences of Tunis, where he was graduated in 1989. He received a doctor's degree from the Faculty of Sciences of Tunis in 1997. He obtained the Habilitation in physics in 2003. Scientific interests deal with the electronic properties of organic conjugated materials and their applications in organic electronics, in particular in the field of solar energy conversion into electric energy. The research activity is mainly focused on the investigation of organic solar cells, with the aim to understand the complex interplay between the chemical structure of materials, their chemical-physical properties and their effects on the performance of solar cells. Contact: samir.romdhane@fst.utm.tn

Mr **Joseph Koffi DATTE**, was currently following a PhD programme at the University Félix Houphouët Boigny, Cocody-Abidjan, Côte d'Ivoire, after obtaining a Master's degree in Electrical and Electronic Systems a few years ago. He was graduated in Education Sciences from Ecole Normale Supérieure, Côte d'Ivoire. In 2017, He attended an ANSOLE summer school at 2IE in Burkina Faso. In 2018, He was a member for the ANSOLE scientific meetings in Côte d'Ivoire (ASMCI). In August 2019, He participated at the photovoltaic summer school on metrology and fault analysis of solar panels at Institut National Polytechnique

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Prof. Martin Kamta obtained a postgraduate Ph.D and a Ph.D in physics of semiconducting materials in 1989 and 1998 respectively. These theses were carried out at the Louis Pasteur University of Strasbourg, France. He is professor in solid state physics at the University of Ngaoundere, Cameroon. His main areas of research are : Physics of solar cells and photovoltaic systems. He is co-author of several scientific papers related to Electron Paramagnetic Resonance (EPR) of semiconducting materials and Maximum Power Point Tracking (MPPT) of solar panels. He teaches courses of electronics, sensors, photovoltaic systems. He is currently the national representative of African Network for Solar Energy (ANSOLE), Cameroon. Contact: Martin_Kamta@yahoo.fr

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Dr. Alarcon Herrera is a Level II Researcher, as designated by the National System of Researchers in Mexico (SNI-II). She received the distinguished scientist state award from Chihuahua in 2010. In November 2014 she participated in the organization of NanoMonterrey International Forum. In 2009, she organized, presented, and served as chair for the 10th International Congress on the Biogeochemistry of Trace Elements (10th ICOBTE).

As a researcher in CIMAV, she has contributed to the academic formation of Bachelor, MSc, and Ph.D. graduate students in the Environmental Science and Technology postgraduate program. She directs different research projects related to water quality and treatment, as well as remediation of sites contaminated with metals and metalloids. She evaluates national and international

research projects, as well as international journal articles from: "Science of the Total Environment" "Ecological Engineering", "Water, Air, & Soil Pollution", "Water Science and Technology", "Water supply", "Water Research", "Journal of Hazardous Materials", "Desalinization", amongst many. She directs national and international research projects, financed by diverse agencies such as the Spanish Agency for International Cooperation for Development (AECID). She has published more than 150 scientific works in technical journals and worldwide congresses.
Areas of research: Environmental Engineering.

- Water & wastewater treatment
    - Applications of Nanomaterials in water treatment
- Remediation of contaminated sites with metals and metalloids.
- Phytoremediation of contaminated sites and water by constructed wetlands.
- Use of Solar Energy in water treatment processes