11TH ANNIVERSARY
2011-2022

INTERNATIONAL ONLINE CONFERENCE (A²IOC 2022)

BOOK OF ABSTRACTS AND BIOGRAPHIES + ANSOLE DECLARATION

4 FEBRUARY 2022

SUPPORTING INSTITUTIONS

ANSOLE´s 11th Anniversary International Online Conference (A^2IOC 2022)

February 4th 2022

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Daniel Ayuk Mbi Egbe
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ANSOLE´s 11th Anniversary International Online Conference (A²IOC 2022)

4th February 2022

In partnership with Riga Photonics Centre, Latvia

Hosted by

Université Mohammed V Rabat, Morocco

&

Zewail City of Science and Technology, Gizeh, Cairo, Egypt



Birthday cake offered by Chancily Matinda

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- Dr. Safae Aazou, University of Mohammed V, Rabat, Morocco
- Dr. Shaimaa A.M. Ahmed, Zewail City of Science &Technology, Gizeh, Cairo Egypt
- Prof. Vidvuds Beldavs, Riga Photonics Centre, Riga, Latvia
- Prof. Samir Romdhane, University of Tunis-El Manar, Tunis, Tunisia
- Prof. Daniel A. M. Egbe, ANSOLE e.V. Schillerstrasse 5, 07745 Jena Germany

Logos of organizing & supporting institutions:





















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 sustainable development 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

Mention of conferences, companies, or products in this document does not automatically constitute an endorsement.

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Table of Content

- Organizers 2
- Logos of organizing and supporting Institutions 2
- About ANSOLE 3

Programm 4

***Zoom Link**: https://us02web.zoom.us/j/81710493040?pwd=QkltOGIyYUFkOGU1UTdaRXVxRTRhQT09*
Meeting-ID: 817 1049 3040 Code: 261507

8.30 am -17pm German time

8.45	*Opening remarks and welcome addresses by* *Daniel A. M. Egbe* *Samir Romdhane*	
Session I	***Moderator: Mohamed Farahat Hameed***	7
9.00	**Presentation of Organic Electronics Lab** Shaimaa A. M. Ahmed Zewail City of Science and Technology Gizeh, Cairo, Egypt	7
9.05	**Horizon European projects** Heba Gaber Delegation of the European Union to Egypt, Cairo, Egypt	
9.10	**International Foundation for Science: 50 years after !** Nighisty Ghezae, Nathalie Persson Andrianasitera International Foundation for Science (IFS), Karlavägen 108, SE-115 26 Stockholm, Sweden	8
9.20	**Presentation of Laboratory of Advanced Materials and Quantum Phenomena** Samir Romdhane University of Tunis El Manar, Tunis, Tunisia	10
9.25	**African-European Research Cooperation and the EU Green Deal** Ineke Malsch EthicSchool / Malsch Technovaluation, Utrecht, Netherlands	11
9.45	**Electrify Africa 2030 & ANSOLE Declaration** Vidvuds Beldavs Riga Photonics Centre, Latvia	13
10.15	**Coffee Break**	
Session II	**Moderator: Dr. Hérvé Tchognia Nkuissi**	14
10.25	**ANSOLE: Activities and Achievements** Daniel Ayuk Mbi Egbe African Network for Solar Energy, Jena, Germany+Institut for Polymeric Materials and Testing Energieinstitut an der JKU Linz, Austria+ College of Science and Technology, University of Rwanda, Kigali, Rwanda	15
10.50	**Presentation of Nanomisene Laboratory** Chérif Dridi NANOMISENE Laboratory, University of Sousse, Sousse, Tunisia,	
11.00	**Presentation of Research and Technology Centre of Energy** Radhouane Chtourou Head of The Research and Technology Centre of Energy, Tunis, Tunisia	

11:20	**Egypt-China Solar Laboratory** Amr Bayoumi, Mohamed Zahran, Aref Elewa Zewail City of Science and Technology, Gizeh, Cairo, Egypt	
11.30	**Silicon Nanowires Solar Cells for Higher Power Conversion Efficiency** Rami El-Bashar Zewail City of Science and Tecxhnology, Gizeh, Cairo, Egypt	17
11.45	**Development of PV Materials and Future of Hydrogen In Morocco** Safae Aazou Faculty of Sciences, University of Mohmamed V, Rabat, Morocco Optics and Photonics Center, MAScIR-UM6P, Rabat, Morocco	19
12.00	**Solar-powered water-treatment for Africa** Bryce S. Richards, Andrea I. Schäfer Institute of Microstructure Technology (IMT), Karlsruhe Institute of Technology (KIT) & Institute for Advanced Membrane Technology (IAMT), Karlsruhe Institute of Technology (KIT), Germany	19
12:15	***Lunch break***	
Session III	***Moderator: Dr. Safae AAZOU***	
13:00	**Cost-Efficient Solvent Technology for Fabrication of Hybrid Solar Cells** Petro Smertenko Institute of Semiconductor Physics, National Academy of Sciences of Ukraine, Kyiv, Ukraine	21
13.20	**Quantum Chemical Calculations of Electronic Structure and Absorption Spectra for Silicon-Clonidine and Silicon-Halogen Derivative of Clonidine Solar Cells** Vadym Naumov V.Lashkaryov Institute of Semiconductor Physics, National academy of sciences of Ukraine, *Kyiv,* Ukraine	23
13.40	**Renewable Energy in North Africa: A Potential Source for Hydrogen Production** Gloria Gladis Sondakh, Xavier Musonye, M. Fahran Fauzan Tandipanga Daniel A. M. Egbe, David Finger, Reinhold Lang Reykjavik University, Iceland+ Energieinstitut an der JKU Linz + Institute of Polymeric Materials and Testing, Johannes Kepler University Linz+Universitas Gadjah Mada, Bulaksumur, Caturtunggal, Daerah Istimewa Yogyakarta, Indonesia+ College of Science and Technology, University of Rwanda, Kigali, Rwanda	24
14.00	**Green Nanotechnology-Based Biosynthesized Copper Nps For Simultaneous Detection Of Antibiotics In Drinking Water** Menyar Ben Jaballah NANOMISENE Laboratory, LR16CRMN01, Centre for Research on Microelectronics and Nanotechnology CRMN of Sousse Technopole. University of Sousse, High School of Sciences and Technology of Hammam, Sousse, Tunisia	25
14.15	**Superconductivity in Renewable Energy** Belakroum Karima Université of Kasdi Merbah-Ouargla, Algeria	27
14.30	**Coffee Break**	
Session IV	**Moderator: Dr. Victor Odari**	32
14.45	**Passivating contacts open the road to 24%efficient solar cell industry**	33

	Osama Tobail ENMOSOL GmbH, Germany	
15.00	**Biomass-Derived Flexible Solid-State Supercapacitor for Microsystems and Wearable Electronic Applications** Elyes Bel Hadj Jrad Centre for Research on Microelectronics and Nanotechnology of Sousse, Tunisia	28
15:15	**Solar Photo-Catalysis Treatment of Synthetic Petroleum Refinery Wastewater Using Bio-Synthesized Zno Nanoparticles** El Golli Asma University of Sousse, High School of Sciences and Technology of Hammam Sousse, Tunisia	29
15.30	**Research and Development of Materials for Li-Ion Batteries and Hydrogen Energy at the Institute of Solid State Physics, University of Latvia** Gunārs Bajārs Institute of Solid State Physics, University of Latvia	30
15.50	**Chlorophyll Enhanced Performance of Silicon Solar Cell :A Preliminary Report** Godwin Idemudia Federal University Wukari, Taraba State, Nigeria	31
16.10	**Renewable Energies, Best Alternatives to Preserve Lake Chad From Climate Change and Develop Rural and Urban Electrification in the Sahel Regions** Aimadji Moudarinan Laboratoire des énergies énergies renouvelables et physiques appliquées. Faculté des sciences Ain Chock, Université Hassan II de Casablanca, Morocco	31
16.25	**UV photodetection properties of poly (3-hexylthiophene)/ZnO Nanorods heterojunction** M. Belhaj, C. Dridi, R.Yatskiv, J.Grym NANOMISENE Laboratory, LR16CRMN01, CRMN of Sousse, Tunisia Institute of Photonics and Electronics, Academy of Sciences of the Czech Republic	33
16.40 | 17.00	**Celebrating ANSOLE & Closing remarks !**	

Biographies of some participants 34
-Jerome Ndam Mungwe 34
-Asma Saaidia 35
-Marthe Djuikom 35
-Chris Seiferth 36
-Joseph Koffi Datte 36
-William Wandji 36
-Rahimat Oyiza Yakubu 37
-Brief report on A^2IOC 2022 38
-Declaration of the conference 40
-List of participants 43

Moderator of Session I



Mohamed Farhat O. Hameed is working in the area of computational modelling of photonic devices. His research interests include design optimization of active and passive nano-photonic and plasmonic devices, silicon photonics, polarization handling devices, nanoantennas, metamaterials, and solar cells. The main applications include biomedical sensors, energy harvesting, and telecommunications. He has an excellent track record of around 275 journal and conference publications mostly in IEEE and IET/IEE journals, two authored books published by the world-leading scientific publisher Wiley and Springer and many book chapters. Further, he acts as a principal investigator (PI) or CO-PI for research projects (funding in the region of 1.84 M USD). He got many national/international awards including best PhD thesis and Mansoura Incentive Awards from Mansoura University for the years 2011/2012, and 2014, respectively. In addition, he has been awarded the Incentive State Award for Engineering Sciences from the Egyptian Government along with the African Union- The World Academy of Sciences (AU-TWAS) Young Scientists National Award in Basic Science, Technology and Innovation, for the year 2014/2015. Furthermore, he received the Shrouk Academy award for scientific innovation in electronic engineering and applications for the year 2015/2016. Additionally, he got the Medal of Excellence from the Egyptian President (August 2017) and Venice Kamel Award for scientific creativity for young researchers in the field of technological innovations for the year 2016/2017 and Amin Lotfy prize for physical science for the year 2017/2018. Recently, he received international Shoman prize in computational physics (2021). He is also a senior member of IEEE, OSA and SPIE. He has joined Zewail City of Science and Technology at Egypt since August 2012 as a founding member of Center for Photonics and Smart Materials where he is currently a full professor at Nanotechnology and Nanoelectronics Program. He is also a member of the Specialized Scientific Council of the Fundamental Science Research and National Committee of Physics at Academy of Scientific Research and Technology (ASRT). Email: mfarahat@zewailcity.edu.eg

Presentation of Organic Electronics Lab at Zewail City of Science & Technology, Gizeh, Cairo, Egypt

Biography



Shaimaa Ali Mohamed Ahmed 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. Email: smohamed@zewailcity.edu.eg

The International Foundation for Science (IFS): 50 years after!

Nighisty Ghezae, Nathalie Persson
International Foundation for Science (IFS), Karlavägen 108, SE-115 26 Stockholm, Sweden

This year, IFS will reach a half century of supporting research grant finance, research and communications skills development, science literacy, agenda setting, networking and collaboration. Because of its unique, bespoke and nurturing approach to supporting early-career scientists within low- and lower-middle-income countries, it is phenomenally well known and appreciated by early career scientists across the 'global south'. The wealth of high quality applications to IFS represents an underutilised resource, whereby securing more resources / upscaling could represent an improved value for money proposition. Apart from the donor resources, which IFS secures and administers, the organisation has an experienced and highly professional multicultural secretariat, currently located in Stockholm, and a BoT that has representatives from all regions where IFS operates. There is an active alumni including six Alumni Associations across sub-Saharan Africa. In line with its establishment by the Pugwash Conference, and its contemporary significance, it has a deep reach into over 90 science academies, three quarters of which are in LLMICs. A huge strength of IFS remains its global network of 1400 scientific peers, many very senior in their field, many eminent former grantees, and a significant academic representation from Nordic countries, volunteering skills and time to evaluate proposals.



Nighisty Ghezae is the Director of International Foundation for Science, Stockholm. Formerly she was the Head of Programmes at IFS and has held responsibilities for coordinating the IFS research programme, helping develop strategy and policy, oversight of research areas, coordinating and evaluating supporting activities provided to the IFS constituency and supervising programme staff. Dr Ghezae has broad experience in the creation of international multi-stakeholder networks, has capacity to engage in dialogue and build effective work partnerships, and has led development processes, linking global goals to national priorities.

She has excellent knowledge of and contacts with researchers, research institutions, policy makers, the development community in Africa, the Middle East, and the Mediterranean. Dr Ghezae has a BA in economics, an MSc in the legal and institutional management of water resources, a Ph.D. in natural resources management and another Ph.D in international economics (impact of the global economy on Africa and its development). She has more than thirty years of professional experience as a lecturer,

researcher, senior network officer, training organizer, program and project leader and evaluator. She has worked as a development consultant (2004-2007) with the UNDP, UNESCO, Sida, DGIS, IDRC, AfDB, Euro Consult, Danida and the EU. As Project Manager with the Global Water Partnership (1998-2004), she managed several integrated water resources management projects and led the work program of four regional offices in Africa and two in the Mediterranean region, as well as coordinating the EU water Initiative in Africa. Email: nighisty.ghezae@ifs.se



Nathalie Persson is scientific coordinator of international support programmes in food science and social sciences research at the International Foundation for Science, IFS. The mission of the foundation is to support the most promising young scientists in the developing world through a competitive small research grant scheme. Whilst IFS is focusing on the sustainable use and management of biological resources, water and aquatic resources, she also follows research in the use of green energy in a circular economy approach, and in solar energy for food processing, food conservation.

Nathalie Persson is responsible for the process of identification of the best candidates with research projects in social sciences and food security and nutrition issues. She preselects projects for further review and recruits independent reviewers as well as senior scientists from all five continents to a scientific committee that makes grant recommendations. She also administers the whole process whilst managing a lasting relationship with the network of human resources who contribute to the mission of the foundation in her research areas of responsibility

She also works with capacity building as a trainer and/or coordinator to train scientific methodology and proposal writing, scientific communication and presentation techniques for prospective grant applicants and grantees. She has demonstrated good results from accompanying measures tailored for applicants from institutions and countries that usually show a low rate of success in research grant applications.

She has initiated, coordinated or managed IFS participation in many scientific events (conferences, workshops, seminars, and scientific meetings) in Europe, Africa, Latin America and Asia, including for example the Pan African conference Food Africa improving food system in Africa, co-funded by the EU; MISTRA (The Swedish Foundation for Strategic Environmental Research) funded initiative on traditional grains, environment friendly solutions and poverty alleviation; Sunray sustainable nutrition in Africa for the years to come funded by the EU; Development of research ideas and writing scientific proposals in green water research in Cambodia co-funded by SEARCA in South East Asia, in biological resources, water and aquatic resources, including food security in collaboration with a national host in Nepal- Nepal Centre for Contemporary Research-NCCR, in Thailand in collaboration with Mahidol University and co-funded by the National Research Council of Thailand-NRCT and Institute of Research for Development- IRD France.

She has managed with demonstrated good results interdisciplinary/team projects: Collaborative research grant programme between Central and West Africa research institutions (CORAF WECARD), the IFS green water research grant project funded by SIDA (Swedish International Development Agency)

She has a strong interest in seeing the harmonization of food safety regulations worldwide, and thereby endeavours to maintain her network in food safety research to keep her updated as a scientific administrator.
She has long experience of working in a multicultural environment and speaks fluently four languages including French and English.
Her background is in food science, nutrition and in business and administration. She was trained in Dijon, France as Ingénieur ENSBANA (Food Science and Applied Nutrition), and as Ingénieur IESIEL-INA in Dairy Economy and Industries in Paris. She was trained as a Marketer at Påhlmans Handelsinstitut in Stockholm, Sweden. Earlier she attended a nine-month business course as well at IGIA ESSEC (Economics and Business School) in Cergy, France. Email: *nathalie.persson(at)ifs.se*

Presentation of Laboratory of Advanced Materials and Quantum Phenomena

Samir Romdhane

University of Tunis El Manar, Tunisia



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. He is one of the founding fathers of ANSOLE. Contact: samir.romdhane@fst.utm.tn

African-European research cooperation and the EU Green Deal

Ineke Malsch

EthicSchool / Malsch TechnoValuation, Utrecht, The Netherlands

Abstract

This online oral presentation will analyse EU-Africa Research Cooperation in relation with the Green Deal of the European Union, aiming to become the first climate neutral continent by 2050. After an overview of the EU Green Deal and the EU-African cooperation focusing on climate change and renewable energy, some open and upcoming calls for proposals and fellowship opportunities open to African researchers and students will be highlighted.

Keywords: Europe, Africa, renewable energy, green deal, funding



Dr. **Ineke Malsch** is an expert in responsible development of emerging technologies in their societal context emphasizing ethical aspects. She has graduated in physics (Utrecht University, 1991) and holds a 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 as ethics partner in the RiskGONE project contributing to risk governance of nanomaterials. She has given lectures, organized dialogue events, published articles and contributed to books for a variety of audiences including scientists, professionals, and lay persons about ethical and responsible development of emerging technologies for a variety of applications including sustainable development and food. She has been the Dutch contact person for the African Network for Solar Energy since 2011.

Electrify Africa – 2030

Vidvuds Beldavs,

Riga Photonics Centre, Latvia

Abstract

An international alliance formed to meet UN Sustainable Development Goal 7 for Africa:

Ensure access to affordable, reliable, sustainable, and modern energy for all people.

The Electrify Africa 2030 consortium is being created to address the important and urgent problem of over 600 million people in Africa with no connection to reliable electrical power. This slows sustainable development and impedes adaptation to climate change in a vast continent of abundant natural resources and human potential stymied by the failure of traditional approaches to electrify the continent. Solutions are emerging to deliver broadband internet communications to people across Africa creating opportunities for information and communications, telehealth, government services and more. Cell phone technology has opened a wide range of services including financial services for trade, but cell phones must be charged and the cell-phone transmission towers and routers must be connected to a source of electrical power. Food security is emerging as a primary concern with reliable electricity offering the capacity for advancing agricultural practices, water pumping for irrigation, refrigeration of crops, cooking, transportation, and many other services.

Current trends indicate that the number of people in Africa with no connection to reliable electrical power could increase by 2030 despite construction of significant large-scale power generating and distribution capacity. If extreme weather events continue to disrupt electrical power distribution as in recent years integrated large-scale grids with points of failure that can disrupt service across large territories may need to be strengthened with microgrids with independent power generating capacity. This could mean that micro-grids could serve as elements of large grids enabled by smart grid

technology assuring reliable distribution of power both in areas of highly develop electrical infrastructure as well as areas such as much of Africa where such infrastructure is absent.

To electrify Africa by 2030 the following are needed:

- Solar conversion and energy storage whose levelized cost of delivered power is highly competitive with all other alternatives.
- Solar conversion and energy storage equipment that is easy to install, generates local jobs and that is financeable by users which may be individual households or local communities served by a microgrid.
- Grid architectures that enable the buildup of large territorial and national grids from microgrids that distribute power generation or can link to large power generating facilities that take advantage of hydro, ocean power, large-scale solar, nuclear power, fusion or other large power generating facilities.
- Major increase in energy harvesting and energy storage R&D capacity in Africa to serve manufacturing and power distribution needs across Africa.
- Development of easy-to-use financing methods to enable rural communities and towns to finance construction and operation of microgrids including training of local personnel.

The project is aimed at advancing technologies for solar energy conversion and storage to improve energy conversion and storage efficiency while reducing total costs and to accelerate deployment to regions presently not connected to national electrical distribution systems.

Consortium partners include research organizations developing breakthrough technologies to

- Exceed the Shockley-Queisser efficiency limit (33.14%)
- Develop manufacturing methods that cut the total installed cost of solar energy conversion and energy storage by at least 50%.
- Develop grid architectures that accommodate local microgrids within larger regional, national and macroregional grids that enable interconnections to assure reliable power under all plausible scenarios including addressing disasters and extreme-weather events that currently can disable power across large regions. This includes assuring reliability of delivered power across large areas that may be subject to disruptions due a wide range of causes including space weather (solar coronal mass ejection), extreme weather events, wildfires, earthquakes and other natural disasters as well as cyberattacks across a network.

The Consortium is intended to engage organizations across the value chain starting from research and development, to manufacturing, to systems financing, to deployment and operation. Innovation has a critical role at all stages initially at the research stage, then conception of potential products that use the research, then innovations in manufacturing of the products, market introduction and deployment. The purpose of the

consortium is to accelerate the process to introduce the innovations as fast as possible as part of the climate change mitigation particularly for Africa and other developing regions which need to accelerate development to meet the needs of their people while controlling or ideally reducing GHG emissions.

Consortium partners could also include trade and professional associations, governments and civil society organizations that address aspects of the problem to accelerate energy technology development and innovation as well as innovation in systems including local systems involved in technology development across the full energy value chain including supply and demand. On the demand side energy charging technology for telecommunications, vehicles, scooters, drones and other transportation equipment need to be part of the picture to accelerate technology development, equipment manufacturing, and deployment.

Electrify Africa 2030 over the 10 years duration of the project

ANSOLE conference 04.02.2022 – organizing event for the consortium!

Year One

Kickoff event. Conference overviewing the project and research and innovation activities at the partners to introduce staff exchange opportunities at the partners concurrently generating a database of researchers / project leaders who could be contacted regarding secondments

Year two – Month 4

Summary conference for Year One covering accomplishments and future plans

Year three – Month 6

Summary conference for Year two covering accomplishments and future plans

Year Four Month 9

Summary conference for Year three covering accomplishments and future outlook for the consortium and its mission thru 2030

Role of UN and World Bank

Role of EU

- EU-Africa Energy Partnership
- Horizon Europe research and innovation funding

Biography



VIDVUDS BELDAVS is an American Latvian who semi-retired to Latvia after leading a multifaceted career in the U.S. including as a futurist and strategist for the multinational firm Cummins as well as serving as the executive director of the international Technology Transfer Society, a founder of several NGOs including NewLeaf-NewLife (criminal justice reform), the U.S.-Africa Literary Foundation with branches in Nigeria, Ghana,

Sierra de Leone (promote the interests of African writers), the Futuristics Study Group (Columbus, Indiana), the North-American-Baltic Business Council (Washington, DC), and most recently, The Riga Photonics Centre to advance the development of photonics in Latvia and the surrounding Baltics region.

As a futurist Beldavs has concentrated much of his attention on energy issues and outer space development. In June 2014 he chaired the International Conference on Cooperation in Space Technologies (ICCST) organized to advance cooperation between the African Union and its member states with firms and research organizations in the countries of the Baltic Sea Region. ICCST resulted in a memorandum of understanding with the African Union Commission and continuing cooperation is underway. He has also led the development of proposals to Interreg Baltic Sea Region to foster greater cooperation in space science and space technologies across the Baltic region. Email: vid.beldavs@fotonika-lv.eu

Moderator of Session II



Dr. Hervé Joël Tchognia Nkuissi

Hervé J. Tchognia Nkuissi received his Ph.D. in Materials Science at the University of Yaoundé I in Cameroon in 2016 after completing his Ph.D. studies at the Hassan II University of Casablanca in Morocco thanks to the African Network for Solar Energy (ANSOLE) doctoral mobility scholarship. Between September 2020 and November 2021, he carried out his postdoctoral studies at the Laboratoire des Sciences de l'Ingénieur, de l'Imagérie et de l'Informatique (ICUBE), University of Strasbourg (France) on Organic photovoltaics within the framework of the Franco-German "Make Our Planet Great Again (MOPGA)" research initiative. The goal was replacing the usual fullerene acceptor derivative ($PC_{71}BM$) by non-fullerene acceptors (NFAs) and blending them with several electron-donor polymers to reach a 15% Power Conversion Efficiency and to approach a device lifetime of 15 years. His works have been the subject of twenty of scientific publications in peer-reviewed journals including a book and 2-chapter books and have been presented in many international conferences in Europe and Africa. In 2013, he has been awarded best PhD student oral contribution prize during the regional workshop on Materials Science for Solar Energy Conversion, Cape Town, South Africa. Currently, he is Assistant Professor at the School of Geology and Mining Engineering, University of Ngaoundéré (Cameroon). His main research field is the design of semiconducting materials for photovoltaic applications, the fabrication of OPVs and OFETs, the numerical simulations of solar cells, the calculation of electronic band structures of photovoltaic materials…Email: hervetchognia@gmail.com

African Network for Solar Energy: Activities and Achievements

Daniel Ayuk Mbi Egbe

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The African Network for Solar Energy (ANSOLE) was initiated on the 4th of November 2010 at Sousse Tunisia by 9 African scientists from Algeria, Austria, Ethiopia, Morocco and Tunisia. ANSOLE was officially launched on the 4th of February 2011 at the Linz Institute for Organic Solar Cells (LIOS) of Johannes Kepler University Linz, Austria, witnessing attendance from Austria, Cameroon, Côte d´Ivoire, Ethiopia, Germany, Italy, Morocco, Nigeria, Scotland, South Africa, Tunisia and Turkey. ANSOLE presently has morethan 1150 personal members in 45 African countries and 31 non-African countries togehter with 4 active institutional members. On its 11th anniversary on the 4th of February 2022, ANSOLE can look back with pride and thankfulness for its achievements, among others, in human capacity building, especially promoting young female researchers in their scientific career. Thanks to the City of Utrecht and to our national representative in the Netherlands, ANSOLE has relaunched its halted fellowship programmes by granting in 2022 a 1 year support to Mrs Rahimat Oyiza Yakubu from Nigeria, a mother of 4 children and PhD student on Renewable Energy at Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.



Daniel Ayuk Mbi EGBE is of Cameroonian origin. He did his BSc in Physics and Chemistry at the then University of Yaounde (presently University of Yaounde I). He pursued his studies at the Friedrich-Schiller University of Jena, Germany, where he obtained a MSc in Chemistry (1995) a PhD in Macromolecular Chemistry (1999) and a habilitation in organic Chemistry (2006). 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) (2016-2021). Since April 2021 he is guest scientist at IPMT and scientific coworker at Energy Institute at JKU Linz since October 2021. He has been appointed Honorary Professor of Organic Chemistry of the University of Rwanda in November 2021. Egbe's main research interest is the design of semiconducting materials for optoelectronic applications.

He is initiator of many scientific bodies, ANSOLE being the most prominent one. He coordinates the network since its launching 11 years ago. Contact: Email: Daniel.egbe@ansole.org. WhatsApp: +4917620925862. Skype: danielegbe1

Silicon Nanowires Solar Cells for Higher Power Conversion Efficiency

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Abstract

Solar energy harvesting is the clean, sustainable, and renewable alternative to fossil fuels. Conversion of the solar-light directly into electrical energy via photovoltaic devices plays a significant method. Recently, successful developments using nanowires-based solar cells (NWs) pave the way for a lesser material consumption, while maintaining the efficiency high. Different nanowires geometries have been proposed to enhance the power conversion. In this regard, different NWs have been implemented such as nano funnel, nano pyramids, and conical structures. It has been shown that the nano-funnel NW design improved the absorption due to the combination of modes produced by the top cylinder and the bottom tapered cone. Furthermore, modified nano-pyramid with a bottom substrate has improved the absorption due to the ability of the grating sidewalls to trap more light through the active layer. Additionally, the spacing between the adjacent nanopyramid structures can exhibit microcavity resonance, which contributes to light broadband absorption improvement. Lately, the optical properties of silicon nanowire solar cells with crescent nanohole have been introduced. It has been shown that the electric field profiles of the proposed NWs are strongly improved due to the excitation of numbers of modes that can be coupled with the incident light in addition to the strengthened nanofocusing effect with improved coupling between the photoactive material and the dielectric shell focus.

In this talk, the optical and electrical properties of modified crescent-shaped (CS) silicon nanowires are presented in detail. The optoelectronic characteristics of the proposed design are numerically examined using Lumerical software. In this regard, the optical performance is studied using the finite difference time domain (FDTD) technique. The ultimate efficiency of the suggested NWs structure is enhanced by 14% compared to the conventional NW assembly. The enhancements of the reported design can be related to the created cavities in between the proposed CS-NWs which force the light to be confined in the lateral direction. Furthermore, the proposed design limits the surface reflection due to the reduced filling ratio compared to the ordinary NW. Therefore, the light trapping is increased, thus, the light absorption is improved. Based on the optimized geometrical parameters obtained, the P-V characteristics of the proposed CS-NW are numerically studied using the finite element method. The proposed design offers conversion efficiency (CE) of 19% and 18.5% in the core-shell and axial junctions, respectively, with an enhancement of 23% compared to the ordinary one. Our study reveals that conserving thin NW n-doping shell could efficiently reduce the NW sidewalls recombination effect. At surface recombination velocity of 10^2 cm/s, the CE of the core-shell junction is reduced to 18.7% compared to 16.6% of the axial junction, with a reduction of 1.6% and 11%, respectively. Therefore, the optoelectronic performance of the core-shell junction was slightly influenced by recombination along the NW surface with respect to the axial junction.



Ramy El-Bashar was born in 1987. He earned the bachelor degree in electrical power department from Shoubra faculty of engineering at Banha University – Egypt, with a third rank on his colleagues at 2008. In 2009, he worked as installation engineer in Nuclear Power Plant Authority (NPPA). After two years, he joined by the national institute of laser enhanced sciences (NILES) for working as a researcher in the application of light in electricity. In 2015, he obtained M. Sc. Master of Science in Engineering Application of Laser in high voltage. He is a research assistant there and interested in the field of renewable energy and especially in solar light harvesting. In 2021, he discussed his doctorate thesis of nanostructured Energy Harvesters with co-operation of Center of Photonics and Smart Materials, Zewail City of Science and Technology

Ramy El-Bashar Participated in the IEEE's 7th Egyptian Engineering Day "EED 2008" during finishing his bachelor. In 2015, he participated in Falling Walls LAB 2015 Cairo and his work in optical current sensing was chosen from one of hundred researches. In 2016, he was one of the organizing team of the 9th International conference of laser application (ICLA 09) held at NILES, Cairo University -Egypt. Also during In December 2016, he participated by a poster work in the 6th International Conference on Modern Trends Physics MTPR-16 organized by Faculty of science, Cairo University, Egypt. Moreover, in 2016, he was one of the organizing team of the 10th International conference of laser application besides participates by a poster work in this conference of using nanowires in the solar energy harvesting.

Ramy El-Bashar published one journal paper in about optical current sensing at January 2016 at Sensors & Transducers. Additionally, he published anther two journal papers in optics express journal in 2021 and scientific report journal in 2022, in addition one conference paper in ACES conference in 2021. Email: v-ralbashar@zewailcity.edu.eg



Prof. **Salah S A Obayya** joined Zewail City of Science and Technology (ZC) in 2012 where he is now Chair Professor and Founding Director of Center for Photonics and Smart Materials (CPSM). He occupied the positions of the Vice Chairman of ZC and Director-General of Research Institutes at the same institution. Prior to Zewail City, he took up several academic posts at Brunel University UK (tenured Associate Professor, 2002), University of Leeds, UK (tenured Professor, 2006) and University of South Wales, UK (tenured Chair Professor, 2008) where he was the Founding Director of Photonics and Broadband Communications (PBC) Research Center and also he was the Director of Postgraduate Programs at the same institution. In May 2006, he has been naturalized as “British” citizen.

He has established an outstanding international reputation in the area of green nanophotonics with focus on the intelligent computational modeling of modern nano-photonic devices enabling technologies needed to realise low-carbon green society. He has published **276** journal publications, mostly in OSA, IEEE and IET/IEE, authored **3** books (Computational Photonics, Wiley 2010 and Computational Liquid Crystal Photonics, Wiley 2016, Computational of Photonic sensors, 2018) both are adopted references for Graduate Programs in Photonics at international Universities such as MIT, Purdue University, Indian Institute of Technology, National University of Singapore, Mansoura University and Zewail City, and **269** conference papers in international conference in photonics, many of these are invited talks, and keynote lectures, attracted external funding, from both industry and Research Councils, in the region of **$ 4.4M**, and supervised to

successful completion **40** PhD students, over **80** MSc/MRes/MPhil students and **15** postdoctoral research fellows. He led the team that developed one of the world's best comprehensive numerical packages for the analysis, design and optimization of nano-photonic devices, and subsystems, where a number of "world-first" numerical approaches have been developed. His five key papers introducing his novel numerical package; have been cited more than 400 times. His publications also have been cited more than **4605** times, with an h-index of **36** and i10-index of 132. His numerical package has been widely adopted by both academic and industrial Photonics communities to analyze, design and optimize the performance of a wide range of nano-photonic devices employed for applications in solar cells, optical telecoms, sensing, optical imaging and encryption and other applications.

He has served the International Photonics Society through active contribution to the organization and technical committees of a number of international conferences. Since 2007, he has been an Associate Editor-in-Chief of the IEEE Photonics Technology Letters, and Associate Editor-in-Chief of the Journal of Optical and Quantum Electronics, and served as Guest Editor-in-Chief of J Optical and Quantum Electronics (2010), and founding member of Editorial Board of Materials Theory Journal (Springer) and acted as Reviewer for many international Photonics Journals such as IEEE J Lightwave Technology, IEEE Photonics Journal IEEE J Quantum Electronics, IEEE J Selected Topics in Quantum Electronics, IET Optoelectronics, OSA Optics Express, OSA Optics Letters, and many others. Moreover, he acted as Technical expert and Reviewer for a number of research funding councils and learnt societies such as Engineering and Physical Sciences Research Council (EPSRC), UK, Royal Society, UK, Royal Academy of Engineering, UK, National Academy of Arts and Sciences, Holland, Science and Technology Development Fund, Egypt, National Telecom Regulatory Authority (NTRA), Egypt and others.

Recently, Dr Obayya has elected as SPIE Fellow as first fellows from Egypt, 2022 and a Fellow to the American Physical Society (APS) in 2021. He was elected as Ordinary Member at IOP Optical Group Committee in 2021. He was elected as the first Arab and African Fellow of Optical Society of America (OSA) in Sep. 2019, and IEEE Fellow of IEEE Photonics Society, January 2021. He was elected Fellow of African Academy of Science (AAS), 2018, and Chairman of Nanotechnology Group of AAS. Also, He was elected as a board member of Egyptian Society of Optical Science and Applications (ESOSA), elected Fellow of the Institute of Engineering and Technology, IET (formerly FIEE), UK, 2010, elected Fellow of The Institute of Physics (IoP), UK, 2010, elected Fellow of The Higher Education Academy, UK, and Senior member of IEEE, USA, 2005, member of Board of Academy of Scientific Research and Technology (Egypt's National Academy of Science), Member of Wales Institute of Mathematical and Computational Sciences (WIMCS), UK, Member of Optical Society of America (OSA), Member of International Society for Optical Engineering (SPIE), USA and Member of Applied Computational Electromagnetic Society (ACES).

As remarkable recognition of his research achievements, he was the recipient of many national and international awards and recognitions such as ACES Computational Electromagnetics Award, the Applied Computational Electromagnetics Society's Highest Award, 2021, African Union Kwame Nkrumah Continental Award for Scientific Excellence 2020 edition, January 2021, Ahmed Zewail Prize for Scientific Knowledge, for spreading the Science and Technology of Photonics for the wider Egyptian community, CCSS, Egypt, 2021, Order of Science and Arts of the first class, the most prestigious medal awarded by President of Egypt, President Abdel Fattah el-Sisi, in the National Science Day, Egypt, 2019, Best Scientific Book, COMSTECH-Awards-2017, 2019, State Appreciation Award, Egypt, 2019, UNESCO Chair, Paris, 2019, Honorary Special Chair Professor of Photonics, University of Nottingham, UK, 2017, for his outstanding world-class research record, elected Senior Associate by Board of Directors, International Center for Theoretical Physics (ICTP), Italy, 2017, for his pivotal role in photonics research and education in Egypt, The Region and Africa and elected Senior Member by Board of Directors, Optical Society of America, OSA, 2017 for his internationally recognized research in Photonics, UAE President Khalifa Award for Distinguished Arab Professor in Scientific Research in April 2017, Doctor of Science (**DSc)** degree in Photonics from City University of London in Jan 2016; a degree awarded only to those who gained international distinction in their own fields, Arab Thought Foundation Award in Scientific

Creativity (Lebanon), Dec. 2015; only one award in all fields of Science and Engineering is granted each year for one Arab Scientist, Egyptian Academy of Scientific Research and Technology (ASRT) Award in Engineering Sciences Creativity, Sept. 2014; only one award is granted each year for an Egyptian Scientist in Engineering Sciences, Abdul Hameed Shoman Foundation (Jordan) Award for Arab Scientists in Engineering Sciences, Oct. 2014; only one award is granted each year for one Arab Scientists in Engineering Sciences, State Award of Excellence for Engineering Sciences from the Egyptian State, Sept. 2013; only one scientist is awarded this prestigious award every year, Incentive State Award for Engineering Sciences from the Egyptian State, Sept. 2005, and many others. Email: sobayya@zewailcity.edu.eg

Development of PV Materials and Future of Hydrogen in Morocco

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Solar-powered water-treatment for Africa

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Abstract
The availability of clean drinking water plays – and will continue to play – a crucial role as both humankind and our planet evolve. Considering the demands on fossil fuel resources, a sustainable solution is required to supply the energy required for the purification process, thus enabling a way around the water-energy nexus paradigm. Such solutions are particularly appropriate for the small-scale, decentralized treatment plants that could be deployed in remote areas with minimal infrastructure, such as an electricity and water supply networks.
This short talk will introduce two avenues that are being pursued to provide clean drinking water via solar energy:

1) Photovoltaic-powered membrane filtration systems, specifically designed to remove contaminants from either surface water or brackish groundwater. Such desalination systems can provide >1m3 of clean drinking water per day and have been extensively field tested in both Tanzania and Ghana, with a particular focus on fluoride removal.
2) At a more materials level, efforts are underway to coat membranes with photocatalytically-active materials – both organic photosensitisers and wide-bandgap inorganic semiconductors. Once exposed to sunlight, these materials generate reactive oxygen species that are able to degrade contaminants in water.



Prof. **Bryce Richards** studied physics at the Victoria Univ. of Wellington (New Zealand) before completing a Masters and PhD in electrical engineering at Univ. of New South Wales (Australia), in 1998 and 2002, respectively. He worked at both UNSW and the Australian National University. In 2006, he joined Heriot-Watt University (Edinburgh, U.K.) as a lecturer, being promoted to full professor in 2008. Since 2014 he is co-director of the Institute for Microstructure Technology (IMT) and Light Technology Institute (LTI) within the Karlsruhe Institute of Technology (Germany). His primary research areas lie in third generation photovoltaics (including perovskite solar cells), spectral conversion (up- and down-conversion), luminescent materials, light management, and solar-powered water treatment systems. Email: *bryce.richards@kit.edu*

Cost-efficient solvent technology for fabrication of hybrid solar cells

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Abstract

There are two main challenges in modern photovoltaics: (i) improving the efficiency of existing solar cells; (ii) searching new approaches, materials and technologies to reduce the cost of converting solar energy into electricity. Here we report the possibility to solve both problems by forming a silicon-heterocyclic amine hybrid due to deposition of organic layers from chemical solutions at room temperature onto Si patterned substrates [1, 2]. Aqueous organic and mixed solvents of thiamine diphosphate hydrochloride (TD), procainamide hydrochloride (PRO), clonidine hydrochloride (CLON), cyanocobolamine (CYCAM), metamizole sodium (MS), laevomycetin (LM) were used for chemical film deposition at room temperature under ambient laboratory conditions. The PV performance as function of the PD molecular structure, hybrid morphology, deposition regime and power solar energy has been analyzed using SEM, optical microscopy, XRA, FTIR spectroscopy, spectral photoresponse study and PV diagnostics. The hybrids have demonstrated the solar energy conversation with an efficiency of 3.7 % to 8.4 % depending on the used organics, chemical solutions and surface and/or interface morphology. Such hybrid organic-inorganic architecture designs with PD yields a number of advantages: (i) the absence of high-temperature thermal treatment and high vacuum; (ii) the lack of purification and additional doping; (iii) better use of the solar spectrum due to Si substrates; (iv) use of an inexpensive and non-aggressive organic medium. Some approaches are being developed to increase efficiency, for example, through the use of plasmonic Au nanoparticles [3] or an additional layer of organic dye [4]. Research is in progress.

Keywords: heterocyclic amine, pattern surface, Au nanoparticles, silicon-organic hybrid solar cells

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Quantum chemical calculations of electronic structure and absorption spectra for silicon-clonidine and silicon-halogen derivative of clonidine solar cells

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Abstract

The ability of heterocyclic amines to form hybrid solar cells at room temperature has recently been demonstrated [1,2]. But the further development of such hybrids requires theoretical research to find appropriate solutions to improve the PV efficiency. To understand the functional features of silicon-organic hybrids at the atomic level, it is necessary to clearly know the geometric, electronic structure and optical characteristics of clonidine and its halogen derivatives as well as their hybrids with silicon. Therefore, the change in electron density in the system due to the replacement of hydrogen atoms by halogens (F, Cl, Br, and I) in the organic part of the hybrids was studied by quantum chemistry. Calculations of electronic structure were performed by the density functional theory (DFT) method with the exchange-correlation functional B3LYP using the base set 3-21G (d, p) with valence cleavage in the FireFly code v.8.2 [3]. Electronic spectra were calculated by the TDDFT (nonstationary DFT) method with the same functional and basic set. Valence MOs in the range of 40x40 were included in the active configuration space. Analysis of the absorption spectra of hybrids with clonidine with a hybrid of fluorine, chlorine, bromine and substituted iodine revealed that in the range of 400-800 nm, the intensity of substituted chlorine is higher, which coincides with the experimental data. It is shown that the formation of a single-center silicon-clonidine hybrid leads to an increase in the UV absorption compared to the original clonidine, and the formation of a silicon-chloride derivative of clonidine hybrid leads to even greater shift of absorption bands to the UV region. The formation of a three- center hybrid leads to the expansion of the absorption in the direction of both long- and short- wavelengths. The inclusion of chlorine atoms in the clonidine increases the absorption capacity of the hybrid. The bond between the organic and the silicon is provided by both nitrogen and two carbon atoms, and a tetrahedral silicon atom on the surface. The bonds can be single-center Si – N and three-center Si – N as well as two-center Si – C; the total energy of the hybrid in the case of a single-center Si – N bond exceeds the energy of the three-center one. Research is in progress.

Keywords: heterocyclic amine, clonidine, halogen, silicon-organic hybrids, PV solar cells

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Renewable Energy in North Africa: A Potential Source for Hydrogen Production

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Humans require energy in order to carry out a wide range of activities. When it comes to energy use, one of the primary considerations is the impact on the environment, therefore, the development of renewable energy sources has recently received more attention.

North Africa has an abundance of renewable energy (RE) resources, especially solar energy and wind energy. The annual average solar irradiation is 2200 kWh/m^2 and the wind speed in the coastal region of the North African countries is up to 9.5 m/s. If these resources are well exploited, they can supply the energy needs of North Africa and beyond.[1]

Wind and solar energy are two renewable sources of energy that will be advantageous in the production of green hydrogen, which will be used for a variety of applications including industrial heat, materials (steel and fertilizer), space heating, and transportation fuel. Natural gas infrastructure may be used to store and transport hydrogen over vast distances in a cost-effective manner, allowing for seasonal storage and transportation of hydrogen.[2]

According to the European Union (EU), green hydrogen is a top priority for achieving the European Green Deal. North Africa through its abundance RE resources can be a source of hydrogen for Europe, and the hydrogen produced in North Africa will be beneficial to both Europe and North Africa, and at long term also Sub-Saharan Africa.[2]

Keywords: Renewable energy, Green hydrogen, North Africa, EU Green Deal

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Gloria Gladis Sondakh is an expert in geothermal risk management, having graduated from Universitas Gadjah Mada, Indonesia, with a degree in Geological Engineering. She is a candidate for a master's degree in sustainable energy at Reykjavik University in Iceland. Gladis is nearing completion of her thesis topic, which is titled "Life Cycle Assessment of the Geothermal Power Plant in the Patuha Geothermal Field, Indonesia". Currently, she is working on a project with the Energie Institut of the Johannes Kepler University in Linz, Austria, which focuses on renewable energy sources and the potential for hydrogen production in Northern Africa. Email: gloria20@ru.is



M. **Fahran Fauzan Tandipanga** is a recent graduate of Universitas Gadjah Mada's Geological Engineering. He started his professional career as a student researcher for three months at a geothermal consulting before being promoted to Jr. Geologist for around four months. He is now collaborating with the Universitas Gadjah Mada Geothermal Research Centre on exploration and pre-feasibility study of the Okka-Ille Ange Geothermal Prospect in NTT, Indonesia. Email: fahranfauzan@mail.ugm.ac.id

Green nanotechnology-based biosynthesized Copper NPs for simultaneous detection of Antibiotics in drinking Water

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Abstract

In this work, we present a novel, fast and green synthesis copper nanoparticles (CuNPs) using *Moringa oleifera* leaves. This biosynthetic process is fast and environmentally friendly, giving place to spherical nanoparticles of 20 ± 2.2 nm of average size. The CuNPs were fully characterized using different instrumental techniques such as UV/Vis, FTIR spectroscopy, and electron microscopy (TEM, FESEM, and EDS). Green synthesized CuNPs were drop-casted onto the surface of screen-printed carbon electrodes (SPCE) to build CuNPs/SPCE modified nanosensor, once its modification was properly optimized, was employed for simultaneous determination of antibiotics: Daptomycin, and Meropenem, obtaining excellent figures of merits concerning: sensitivity, low limit of detection and selectivity. This nanosensor has been employed successfully for antibiotics determination in tap, and mineral water with satisfactory matrix effect values.

Keywords: Green nanotechnology, biosynthesized CuNPs, Moringa oleifera, antibiotics, nanosensor, drinking water.

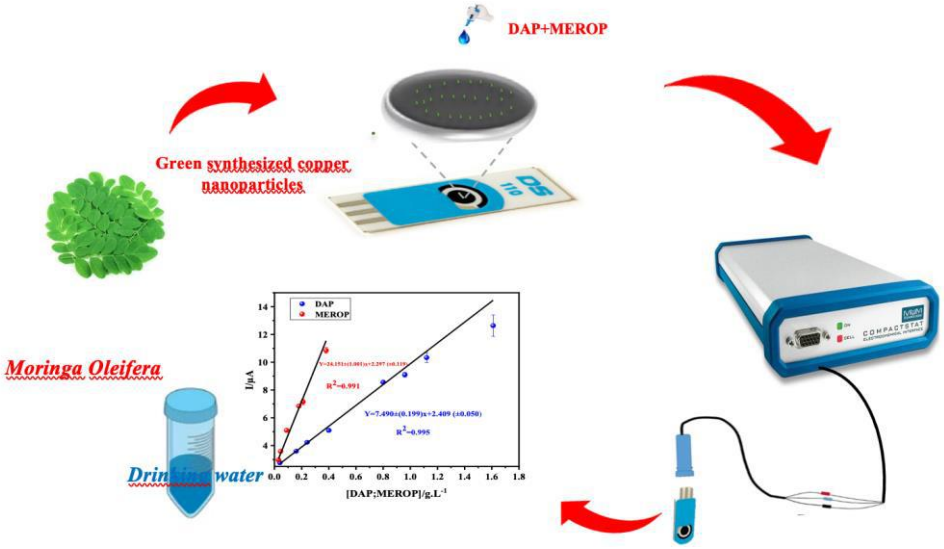


Figure: Simultaneous detection of antibiotics in drinking water.

Biography



Menyar Ben Jaballah 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 sustainable nanomaterials with the aim of environmental sustainability. Her research will focus on emergent contaminants detection based on nanomaterials. Before starting a 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. Email: menyar96@gmail.com

Superconductivity In Renewable Energy

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Université of Kasdi Merbah-Ouargla, Algeria,

Abstract

In 1911, while studying the properties of matter at very low temperature, the Dutch physicist Heike Kamerlingh Onnes and his team discovered that the electrical resistance of mercury goes to zero below 4.2 K (-269°C). The majority of chemical elements become superconducting at sufficiently low temperature. Below a certain “critical” temperature, materials undergo transition into the superconducting state, characterized by two basic properties: firstly, they offer no resistance to the passage of electrical current. When resistance falls to zero, a current can circulate inside the material without any dissipation of energy. Secondly, provided they are sufficiently weak, external magnetic fields will not penetrate the superconductor, but remain at its surface. This field expulsion phenomenon is known as the Meissner effect, after the physicist who first observed it in 1933. Superconductivity continued to spring surprises for decades afterwards. Superconductivity can also help with another major pitfall of renewable energy: its fickle nature. Superconductors can help tackle such "intermittency" problems via Meissner effect. If a magnet is brought near a superconductor, it experiences a force field that allows it to defy gravity and levitate. Known as "flux expulsion", this is more than just a party trick, however; it can be used to create frictionless bearings for gigantic energy-storing flywheels. The electricity produced by, say, wind turbines is used to spin up these flywheels, which then spin rapidly at a virtually constant rate on their frictionless bearings. Their huge rotational energy can then be turned back into electricity whenever it is needed even if the wind turbines that supplied them are no longer turning. In our study we attended Bi2212 phase, it belongs to high temperature superconductors, ceramic type doping with nickel oxide (NiO) in different amounts 1% based on oxides: Bi_2O_3, $SrCO_3$, $CaCO_3$ and CuO, the samples prepared using X-ray diffraction method, scanning electron microscope and ultraviolet ray for structural and optical study. Refinement of X-ray diffraction (XRD) was carried out by material analysis using diffraction (MAUD) program to obtain the structural parameters such as lattice parameters, site occupancy of different atoms and orthorhombicity value for all samples. Results show that NiO doping does not change the structure. The scanning electron microscopy (SEM) images of the samples show better grain connections by NiO doping. The energy gap is so small, from the order of 10^{-2} or 10^{-3}, that it cannot appear in the spectrometer. The UV-Vis spectra show the sample to be conducting at room temperature with no band gap present at 300K.

Biography



My name is **Karima BELAKROUM**; I am a teacher researcher at university of Kasdi Merbah-Ouargla, Faculty of Mathematics and condensed Matter, department of physics in Algeria. I did my undergraduate studies and Ph.D. at Constantine University. My research interests lie in the area of physics, experimental condensed matter, new and renewable energies. Other research visits abroad have included University of Augsburg, GERMANY, and international Center of Theoretical Physics (ICTP), in Italy.

Sustainable Real Estate in Egypt

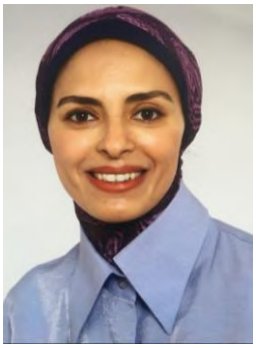
Mekky Lamiaa

Alexandria University- Faculty of Law, Egypt

Abstract

Globally, buildings can account for up to 40 percent of total energy consumption and 20 percent of greenhouse gas emissions. In many African cities, residential buildings are the second largest energy consumer after transport meaning that energy efficiency in the buildings sector presents a valuable opportunity to reduce emissions. By implementing simple, affordable changes, cities are increasing efficiency, and thereby significantly reducing energy demand. Apart from lessening the city's dependence on fossil fuels, the reduced energy demand in turn increases the viability of renewable energy systems. This paper examines the main legal rules concerning the green building strategy in Egypt. The focus of this work is to assess the main building code in Egypt -the Unified Building Law No.119/2008 with its executive appendix-from the green point of view, and to review the main concepts of the public review version of the Green Pyramid Rating System and the opportunities of enforcing it. The method of this goal is the descriptive method, analysing the main concepts of the laws and the stipulations regarding green building strategy of Egypt. Comparative aspects regarding the International Green Construction Code (IGCC), the first international model code that includes sustainability measures for the entire construction project, are taken into consideration. Hence, the study leads to a better understanding of the possibility of greening building codes in Egypt and for more effective implementation in the real- estate market. Following that aim should be accompanied with outlining the economic benefits of investing in green buildings. As high costs of necessary materials, lack of efficient expertise in enforcing the concepts and public awareness will remain future challenges fur simple, clean and affordable green building.

Biography



Dr. Lamiaa Mekky is an associate professor for civil law in the Faculty of Law- Alexandria University. She studied Law in Egypt and pursued her postgraduate studies at the Friedrich Schiller University jena. She obtained her Master of Laws (L.L.M) at the FSU Jena in 2009. Subsequently she made her doctorate degree from the same university in 2018. Her research time covered a vast scope of legal topics: comparative law, corporate law, security law, etc. During that time, she participated in the broad project of the Refugee Law from 2017- 2019. She is also interested in interdisciplinary research as Law and Economics, Urban economics, Energy Law and Law and Technology. Dr. Mekky is a member of the Egyptian Bar Association, the Society of Legal Scholars and the African Network for Solar Energy e.V. (ANSOLE e.V.). Email: dr.lamya.mekky@gmail.com

Biomass-derived flexible solid-state supercapacitor for microsystems and wearable electronic applications

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[2]Higher School of Science and Technology of Hammam Sousse, Tunisia.

Abstract
Supercapacitors are energy storage devices that are often characterized by high power densities, fast charge/discharge cycles (sec-min) and long lifetimes (>10^6 cycles) which makes them very interesting components especially when they are implemented in energy management and conversion networks. The recent scientific strategy is to manufacture environmentally friendly, low-cost, and flexible devices for powering miniaturized electronic systems, as well as portable and wearable electronic devices. In this context, this work presents a carbon based solid-state symmetrical supercapacitor with electrochemical performances relatively similar to those based on commercial carbon. Indeed, Biomass-derived electrodes were implemented with a quasi-solid-state electrolyte in an optimized sandwich structure using flexible substrates, to guarantee a combination of flexibility and low-cost aspect. The fabricated supercapacitor exhibits interesting electrochemical performances in terms of areal capacitance, power and energy densities comparing to the commercial carbon-based devices. According to the literature, the fabricated supercapacitor may be a promising candidate for microelectronic and wearable electronic applications.



My name is **Elyes BEL HADJ JRAD**, I'm holding a master degree of research in electronic 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 ecological and low-cost supercapacitors based on green nanotechnology, for wearable electronics and microsystems applications. Email: elyes_bj@yahoo.com

Solar photo-catalysis treatment of synthetic petroleum refinery wastewater using bio-synthesized ZnO nanoparticles

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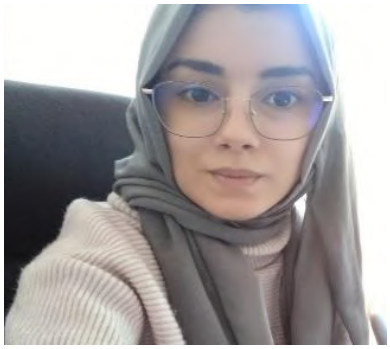
[3] University of Sousse, High School of Sciences and Technology of Hammam Sousse, Tunisia

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Abstract

Green-synthesized materials and simulated sunlight for advanced oxidation processes (AOPs) offer important opportunities in water remediation by giving value to clean, renewable and potentially low-cost resources. Here, Zinc Oxide (ZnO) nanoparticles (NPs) were prepared via a green synthesis method based on plant extract of Moringa oleifera (ZnO-Green), resulting in crystalline wurtzite nanostructures as confirmed by XRD, TEM, FESEM, and EDXS analysis. ZnO NPs were also chemically prepared through a conventional method (ZnO-Chem) for comparative solar photocatalytic (PC) studies. Solar light was simulated by a solar box equipped with an air-cooled 1500-W Xenon lamp, which allows 300–800 nm wavelengths to pass through and irradiance was set to 250 W/m^2. The results showed that the bio-synthesized ZnO NSs exhibit a favorable photocatalytic activity for the degradation of the organic compounds in synthetic petroleum refinery wastewater during exposure to simulated sunlight. Comparison with the chemically synthesized ZnO, results in a higher performance for the NPs produced via green method under optimum loading conditions. This study shows that the combination of green-synthesis and sunlight paves the way for ecofriendly sustainable strategy to petroleum refinery effluent treatment solar processes.

Keywords: Environmentally-friendly synthesis, Zinc Oxide nanostructures, petroleum refinery wastewater, sunlight-driven photocatalysis.



Asma El Golli is a 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 developing innovative environmental and biomedical applications. Her research addresses key concerns about solar wastewater treatment and sensors for diseases diagnosis 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. She also has been nominated as Representative of Ph.D. students on the Scientific Council of the CRMN.

Research and development of materials for Li-ion batteries and hydrogen energy at the Institute of Solid State Physics, University of Latvia

G. Bajars, J. Hodakovska, J. Kleperis, K. Kaprans, A. Knoks, P. Lesnicenoks, G. Kucinskis
Institute of Solid State Physics, University of Latvia (ISSP UL)

Abstract

ISSP UL is an internationally recognized leading materials research centre in Latvia and Baltics. Research on material application for energy harvesting and storage is among the main research topics of the institute.
Research priorities in battery materials and technologies includes: (1) novel electrode materials for Li-ion and Na-ion batteries; (2) ageing of Li-ion materials and cells; (3) fundamental research of mass transport in ionic and mixed ionic-electronic materials. Investigated electrode materials include $LiFePO_4$, mixed Li / Na manganese phosphates for cathode and graphene oxide, Fe_2O_3, TiO_2, composite materials for anode.
Our recent studies have been focused on electrochemical properties of LiFePO4 cathode for Li-ion batteries as well as NCM-based commercial cells. We have determined a correlation between material ageing and the overvoltage and thus internal resistance. Ageing of commercial Li-ion battery cells was also studied, finding that the temperature where the longest service life is observed shifts to higher temperatures with increasing rate of charging.
Other recent activities on research of materials and technologies for hydrogen applications include:

- explaining hydrogen technology and economics to students, politicians and entrepreneurs;
- research of electrode materials for electrocatalytic exhaust CO_2 reduction to useful products;
- research for stationary and mobile applications for electricity and heat production.

Acknowledgement: Research project «Cycle life prediction of lithium-ion battery electrodes and cells, utilizing current-voltage response measurements», Agreement No: Nr. lzp-2020/1-0425, funded by Latvian Council of Science.

Biography

Gunars Bajars, Dr.chem. (h-index=7, total citations – 543, ORCID ID: 0000-0001-8066-9633) is a Senior Researcher at the Institute of Solid State Physics, University of Latvia (ISSP UL), Laboratory of Materials for Energy Harvesting and Storage. He received his doctoral degree from Latvian Academy of Science in 1992. The main research areas are chemistry and physics of materials, electrochemistry, solid state ionics, electrical and optical properties of materials, electrochromic phenomena and electrochemical storage devices. During last ten years G. Bajars is working in the field of preparation and characterization of materials for lithium and sodium ion batteries. He was a head of Solid State Ionics laboratory from 2014 to 2018 and a member of Scientific Council of ISSP UL from 2012 to 2021.
Gunars Bajars is a member of International Societies of Electrochemistry and Solid-State Ionics, national expert in European Commission Batteries Europe Platform WG3 Advanced Materials, as well as an expert for EC Innovation Fund and Horizon Europe research projects in the field of energy storage. The technological development for depositing $LiFePO_4$ thin film coatings to use them on batteries and accumulators in portable electrical appliances and microelectronics was ranked among Top 10 scientific

achievements in 2010 in Latvia. During the time period of 1999-2001 he has been a rector of Vidzeme University of Applied Sciences.

Chlorophyll Enhanced Performance Of Silicon Solar Cell (A Preliminary Report)

G. Idemudia and Abel Jacob
Federal University Wukari, Nigeria

Abstract

Solar cells or photovoltaics abstract irradiation from the sun and convert same to electrical energy by initiating flow of electrons; while plants use photon energy to break water molecule in a light reaction process in the thylakoid membrane. The project is to abstract the electrons so created for current generation before activation of the Kreb cycle. TiO2 serves as the photoanode while carbon serves as the cathode. Short circuit current of 0.030 $mAcm^{-2}$ was detected on a 0.25 volts leading to an initial efficiency of 0.0513%. The chlorophyll is extracted from tea leaves (Camellia Sinesis) commonly grown in the Mambilla Plateau of Taraba State, Nigeria.

Brief Biography

Godwin Osama Idemudia is a Professor of Renewable Energy, born in Benin City, Nigeria, He attended the university of Ilorin, Ilorin Nigeria form 1977 to1981 and from 1987 to 1993 where he obtained his BSc (Hons) and PhD respectively. He is currently a lecturer with the Federal University Wukari, and also the Director of the Energy Centre of the University. He has been a Professor for ten (10) years now and has lectured in the university system for over 25 years. He is married with children.

Renewable Energies, Best Alternatives To Preserve Lake Chad From Climate Change And Develop Rural And Urban Electrification In The Sahel Regions

Aimadji Moudarinan,

Laboratoire des énergies énergies renouvelables et physiques appliquées .Faculté des sciences Ain Chock, Université Hassan II de Casablanca, Morocco

Abstract

Le Tchad, situé en Afrique centrale, est classé 5^{e} pays en Afrique et 20^{e} au monde en terme de superficie dont plus de la moitié (63 %) est désertique. Il subit une avancée rapide de la désertification estimée à une vitesse de 1km/an due à un déficit pluviométrique et au déplacement du sable saharien par la mousson du Nord au Sud, première cause de disparition du Lac Tchad, classé entre les grands lacs d'Afrique. Parmi plusieurs projets en cours pour protéger ce Lac mais très peu mentionnent l'adoption des énergies renouvelables que la région regorge une énorme potentialité inexploitée dont son exploitation demeura écologique et contribuera au développement économique et social, précisément dans la réduction de la pauvreté, l'augmentation du taux d'accès à l'énergie ou l'électrification rurale et urbaine pour les activités agropastorales. Pour remédier à toutes ces problématiques climatiques, nous présentons en premier lieu les causes de la disparition du Lac et en second lieu l'une des solutions écologiques appropriées qui est celle de l'adoption des énergies renouvelables, comme facteurs de développement économique, social et de la protection de l'environnement dans le bassin du Lac Tchad poumon de l'économie et sécurité sous régionale des pays membres de la Commission du bassin du Lac Tchad.

Moderator of Session IV



Dr. Benjamin Victor Odari is a Physics Lecturer in Materials Science in the Department of Physics, School of Natural and Applied Sciences at Masinde Muliro University of Science and Technology. He graduated with a degree in Bachelor of Education in Science (Physics and Mathematics) in 2009 and Master of Science in Physics in 2013 both from Masinde Muliro University of Science and Technology. He obtained his PhD in Renewable Energy in September 2019 at University of Nairobi, Kenya. Part of his PhD research work was done at the Institute of Energy and Climate Change (IEK5), in Forschungszentrum Jülich, Germany under the scholarship of DAAD. Dr. Odari is involved in research infrastructure development and capacity building in the area of Materials Science. He is a member of the African Network for Solar Energy (ANSOLE) & the country representative for Kenya and a number of scientific networks in the area of energy in Kenya. Dr Odari is also a co-founder and treasurer of Materials Research Society of Kenya (MRS-K) https://mrsk.or.ke/ and a committee member of Materials Science Committee in Kenya. His current research focuses on characterization of materials and devices for solar energy conversion. Contact: Benjamin Victor Odari, B.Ed (Sci), MSc (Physics), PhD Physics.

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Passivating contacts open the road to 24% efficient solar cell industry



Osama Tobail
ENMOSOL GmbH, Germany

Abstract

To reach the zero emission targets, we need to increase the efficiency of the clean energy generation and make it available with cost competitiveness. Due to the recent advances of photovoltaic technology and the significant cost dropping, it is currently showing one of the highest installed renewable energy systems especially in commercial and residential applications. It is also realized that electricity storage is an essential component of the energy system either to improve its efficiency or security. For example, the market of Lithium-Ion Battery is drastically increasing as electricity home storage as well as for electrical mobility. This presentation will show our contribution as a technology partner for high efficiency solar cell Industry. Passivated Emitter and Rear Cell (PERC) is the mainstream, achieved on the laboratory scale 24% with average efficiency in the industry ~22.6%. Further optimizations are being performed together with cell manufacturer and research institutes to bridge the gap between lab and fab cell efficiencies by working on minimizing the carrier recombination at the cell. The main source of carrier recombination is at the interface between silicon and metal contact, which makes the potential limited at 24.5%. Achieving efficiencies beyond the PERC limit have been realized by eliminating the silicon/metal interface and replacing it by passivating contact (or carrier selective contacts) such as Tunnel Oxide Passivated Contacts (TOPCon) technology based on polycrystalline silicon (PolySi) or Heterojunction passivated contact solar cells based on

amorphous silicon (a-Si) and transparent conductive electrodes (TCO). To exceed the 25% limit, we need to develop cells based on passivating contact instead of direct contact of metal and semiconductor, where the main carrier recombination takes place. This presentation will show the newly developed techniques for tunnel oxide/poly silicon deposition on industrial scale of large wafers and mass production. Despite the recent developments achieved, it seems that we have another limit facing us which is the single junction limit. This limit can only be exceeded by developing Perovskite/Silicon tandem soar cells with potential efficiency of 30%. Biography

Dr. Osama Tobail is the founder and CEO of ENMOSOL company for clean energy and mobility solutions in Germany. He has been working in several R&D positions in research institutes as well as photovoltaic industry in Germany, Egypt, Turkey, USA and China. In 2019, he joined an equipment and technology providing company for high efficiency solar cell industrialization in China as R&D director. Dr. Tobail has moved to solar cell manufacturing technologies in 2017 by working as process integration engineer at centrotherm AG in Germany. This came after about eight years journey in research and development institutions at University of Stuttgart, IBM Watson Research Laboratoriesin USA, Egypt Nanotechnology Center (EGNC), Zewail City of Science and Technology and Bilkent University in Turkey. During his work at EGNC senior research scientist he was responsible for establishing solar cell fabrication and characterization lab and leading young researchers. In 2008, Dr. Tobail has completed his PhD (Dr.-Ing.) in photovoltaics from the Electrical Engineering department, University of Stuttgart, Germany

UV photodetection properties of poly (3-hexylthiophene)/ZnO Nanorods heterojunction

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[1]NANOMISENE Laboratory, LR16CRMN01, CRMN of Sousse, Tunisia
[2]Institute of Photonics and Electronics, Academy of Sciences of the Czech Republic, Chaberska 57, 18251 Prague 8, Czech Republic

Abstract
In recent years researches have been conducted to develop inorganic-organic based nanoarchitectures for self-powered photodetectors which take advantage from the low production costs, high mechanical flexibility, high absorption coefficients and large area production possibility of organic constituents and the high carrier mobility of inorganic material [1, 2]. In this work, we demonstrate a facile way to fabricate hybrid heterojunction photodetector with poly (3-hexylthiophene) (P3HT) and a 1D ZnO nanorod (NR) arrays as the electron donor and acceptor, respectively. The ZnO NRs were synthesized by a low temperature two-step hydrothermal method on n-type silicon substrate. Graphite and eGaIn were used as ohmic contacts to P3HT film and Si substrate, respectively. Basic electrical parameters for eGaIn/Si/ZnO/P3HT/Graphite structure were calculated from I-V characteristics under dark and various power illuminations. The device exhibits high sensitivity to UV light illumination with a large degree of reproducibility. A short-circuit current Isc of 19.4µA, an open-circuit voltage Voc of 0.24V giving rise to a responsivity of about 21.7 mA/W have been obtained for the illuminated graphite/ P3HT/ZnO NRs/Si/EGa-In structure based near UV light sensor The origin of

photoconductivity properties of ZnO/P3HT device has been explained using carrier transport mechanism at interfaces.

*[1]*A.G.Imer,A. Tombak, and A. Korkut, "Electrical and photoelectrical characteristic investigation of a new generation photodiode based on bromothymol blue dye," in *Journal of Physics: Conference Series*, May 2016, vol. 707, no. 1. doi: 10.1088/1742-6596/707/1/012012.

Biographies of some participants



Jerome Ndam Mungwe is a holder of a PhD in Science Technology Energetics and Nuclear (STEN) from Politecnico di Milano-Italy. His core profession values/believes are passion, commitment and integrity in the applications of Energy Engineering solutions to improve human living standards, especially in the rural areas. He has professional experiences as author a practitioner, researcher and trainer in Renewable Energy Technologies to improve access to modern energy in rural areas and a University Lecturer. As a practitioner he has designed and supervised the construction of micro hydropower plants in some rural areas of Cameroon, designed and installed several
solar PV home systems and domestic biogas systems. His research accomplishments include five published articles, chapter contribution to a book and a technology manual. He is currently researching on a business model of a plastic biogas digester system for rural and urban applications; performance evaluation of mini grids powered by renewable energy sources- Solar PV and Micro hydropower. He has participated in 5 international conferences (including 2 ANSOLE organised conferences). Professionally,
he was a secondary school teacher (1998 -2006), technical adviser in Renewable Energy with an NGO in Cameroon (2008 -2010), Assistant Lecturer with the School of Engineering at the Catholic University of Cameroon-Bamenda (2010 -2019). He was an instructor at the National Higher Polytechnic Institute of the University of Bamenda (2019-2020)- He is currently a Lecturer at the Higher Technical Teachers Training College of the University of Bamenda and member of the Scientific Committee of the Department of Electrical and Electronic Engineering of the National Higher Polytechnic Institute of the University of Bamenda. Email: Mungwe.jerome@uniba.cm



Asma Saaidia is currently a contract assistant at the Faculty of Sciences in Gafsa. She
obtained her doctoral degree in physics in 2017 from the Faculty of Sciences of Tunis
Elmanar Tunisia, holding her research activity at LAMQP (Laboratory of advanced materials and quantum phenomena), under the supervision of Professor Samir Romdhane. Asma worked on photovoltaic solar panels (Renewable energy). Her thesis subject concerns the study of the optical properties of organic conductive polymers. These materials have been

marketed for a few years for various applications, there are, principally, photovoltaic cells and OLEDs which are used for display in the field of flat screens and as a lighting panel. Before starting Ph.D., she holds a Research Master's Degree in Quantum Physics and a Fundamental Bachelor's Degree in Physic and chemistry, both from the Faculty of Sciences of Tunis Elmanar Tunisia. She participated in several national and international conferences and congresses and she did a three-month internship in the Center For Energy and Environmental Chemistry Jena under the Supervision of Dr. Harald Hoppe. Asma is a membership in the African Network for Solar Energy (ANSOLE). Email: asmasaaidia.ph@gmail.com. Address: Rass Elkef Gafsa 2151Tunisia. Phone number: +201622324536



Dr. Marthe Djuikom

After a General Certificate A level in Mathematics and physics, Dr Marthe Djuikom, follows an academic year at the Faculty of Sciences of Yaoundé university, Maths & Computer department. She was then admitted at the African professional Sub-regional (Central Africa) Institute of Statistics & Applied Economy (ISSEA) of Yaoundé. She got her applied and engineering degree in statistics in 1987.

While studying at ISSEA, she registered at the Faculty of Economy at Yaoundé University and got a Bachelor's of economy option Economy policies analysis, in 1990. In 2002 she obtained a post-graduate (msc1) in Social & Economic Policies (option management of projects' development) at the Catholic University of Louvain in Belgium; then an inter-academic diploma (DEA) in 2004 in Environment, Development and Societies.

From her work with Belgium universities, she registered, as Ph.D student at the university of Kassel in Germany, at the department of developing countries' sociology and policies of the faculty of sociology. She defenced her doctorate thesis in social sciences option sociology of development, under the title: *"sustainable energies for rural areas in Saharan Africa: interdisciplinary approach and organisational challenge*"

Since then and from her applied research output, she focuses her work on energy for African sustainable development, mainly in rural areas with youth and gender issues considerations. Besides education and studies, she was professionally engaged in various Cameroonian institutions before create the Euro-Africa network (FERDEDSI) of energy organisations. She so operated at the Cameroonian national accounting and statistics and at the department of regional actions, both at the Ministry of Plan and Regional development, then at the Ministry of environment where she mainly works in various Cameroonians' international cooperation projects.In 2011, with the various Euro-Africa achievements of the network FERDEDSI, she was one of the three annual laureates of the French Foundation Poweo (today Direct Energy). With her prize she increases implementation of small energy systems in Cameroon to improve the life's quality in Cameroonian's rural non-electrified and isolated areas. She got ANSOLE (African Network for Solar Energy) third prize in 2012 and create an institute of practice (IPEED) in 2014. she has so been working from the field of local development and human resources management to the training and local enterprises promotion. The Euro-Africa network she coordinates facilitates sustainable development promotion in Sub-Saharan Africa through capacity building and economic opportunity creation for various target groups (local people, women, youth, communities, energy actors and incubators, researchers…)

and institutions (, municipalities, academics, NGOs, technology centres, politics…).With her multidisciplinary training background, she hardly works on putting together these various stakeholders from various sectors and disciplines and she easily embraces maters of interdisciplinary and sustainability in several development's dimensions. Contact: info@ferdedsi.com / djuikom2@yahoo.fr



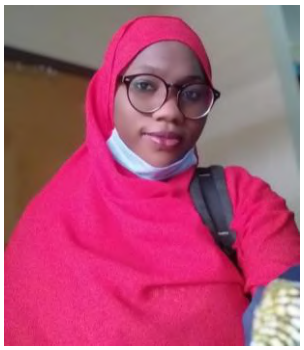
I am **Chris Seiferth** and I am of German origin. I worked till end of Jaunaury 2022 as a social worker at the AWO RegionalverbandMitte-West-Thüringen, Jena with the main focus on socio-pedagogical family assistance for families with migrant background. Since 2019 I am partially employed at the AMAH-ANSOLE e.V. project to organize and conduct cultural events, drafting of proposals as well as administrative tasks. As such, I was strongly involved in the organization of Africa Day 2020 & Africa Days 2021. Due to my studies in social work at the University of Applied Sciences Jena and Master in sociology with the focal point on "Social Change and Sociological Diagnosis of Time" I also had the chance to stay in France and Romania. Email: chris.seiferth@ansole.org



Dr **Joseph Koffi Datte**, has completed a PhD programme in 2022 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 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 Félix Houphouet-Boigny (INP-HB) His research focuses on photovoltaic material conversions. He is an active ANSOLE member since morethan 5 years. Email address: dattjos@yahoo.fr



Dr. **William Wandji** graduated in theoretical physics at University of Yaounde I (Cameroon) in 2010. In 2015, he obtained a Ph.D. degree in Energy and Processes at Mines ParisTech (France) on the estimation of solar radiation for application domains such as Ultraviolet, photosynthesis, daylight and photovoltaic systems. Since 2016, he has mainly been working as Post-Doc at Finnish Meteorological Institute in Finland. His research focuses on development, improvement, and evaluation of algorithms/methods for meteorology, solar radiation and radiative impacts of aerosols dealing with both -satellite and ground- based measurements. Email: williamwandji@yahoo.fr



Rahimat Oyiza Yakubu is a Nigerian, currently pursuing a PhD at Kwame Nkrumah University of Science and Technology in Ghana. She holds MEng and BEng in Electrical and Electronics Engineering. Her area of speciality is energy policy, photovoltaic system design, performance monitoring, and solar thermal performance evaluation. She is working on the bifacial photovoltaic systems for her dissertation. And she is also the first female to be awarded the Utrecht-ANSOLE grant to support her cost of living as she is a mother of four.

Email: rahimayakubu@gmail.com

Brief Report on A^{2}IOC 2022

A2IOC 2022 was initiated and planned within less than 4 weeks. The early involvement of Prof. Vidvuds Beldavs, Chairperson of Riga Photonics Centre, Latvia, brought in an additional dynamic in the preparation phase. This was possible through the existing cooperation between Zewail City of Science and Technology and Riga Photonics Centre. As such, following ultimate call for registration and submission of abstracts was made:

ANSOLE´s 11th Anniversary International Online Conference (A^{2}IOC 2022)

4th February 2022

In partnership with Riga Photonics Centre, Latvia

Hosted by

Université Mohammed V Rabat, Morocco

&

Zewail City of Science and Technology, Gizeh, Cairo, Egypt

*Given the ease to meet online, it has been agreed to organize, in addition to **ANSOLE DAYS**, each 4th of February an **ANSOLE´s Anniversary International Online Conference (A^{2}IOC)**. A^{2}IOC enables our members worldwide to celebrate together and "talk science" from their sitting rooms. The 2022 edition is partnered by Riga Photonics Centre, Latvia, and is co-hosted by Assistant Professors Dr. Shaimaa Ali Mohamed Ahmed (Zewail City, Egypt) and Dr. Safae Aazou (UM5Rabat, Morocco). We invite young scientists from Global South to use this opportunity to present their work to an international audience and expand their networks. Topics related to renewable energy, water, sustainability, green hydrogen, waste management, circular economy, green technologies, climate change mitigation and beyond are welcome.*

Would you like to co-host one of the subsequent editions? If yes, please email daniel.egbe@ansole.org & samir.romdhane@fst.utm.tn

*Please submit abstract (½ page) with/or the registration form below & short biography (½ page) + picture to Ansole2022sa@gmail.com **Deadline for abstract submission: 28.01.2022! Acceptance notification: 31.01.2022***

As a PhD holder, if you are interested to be a member of the scientific committee, please mention it in your email to the organizers.

Registration

Title:
Name(s):
Surname:
Affiliation:
Country:
Email:
Cell (please indicate if it is WhatsApp):

Conference fee is 60 Eur (African participants) and 100 Eur (others). Fee includes: right to present, event booklet, certificate of participation and 1 year membership fee. Please transfer fee to:

***Recipient:** ANSOLE e.V., Schillerstrasse 5, 07743 Jena, Germany*

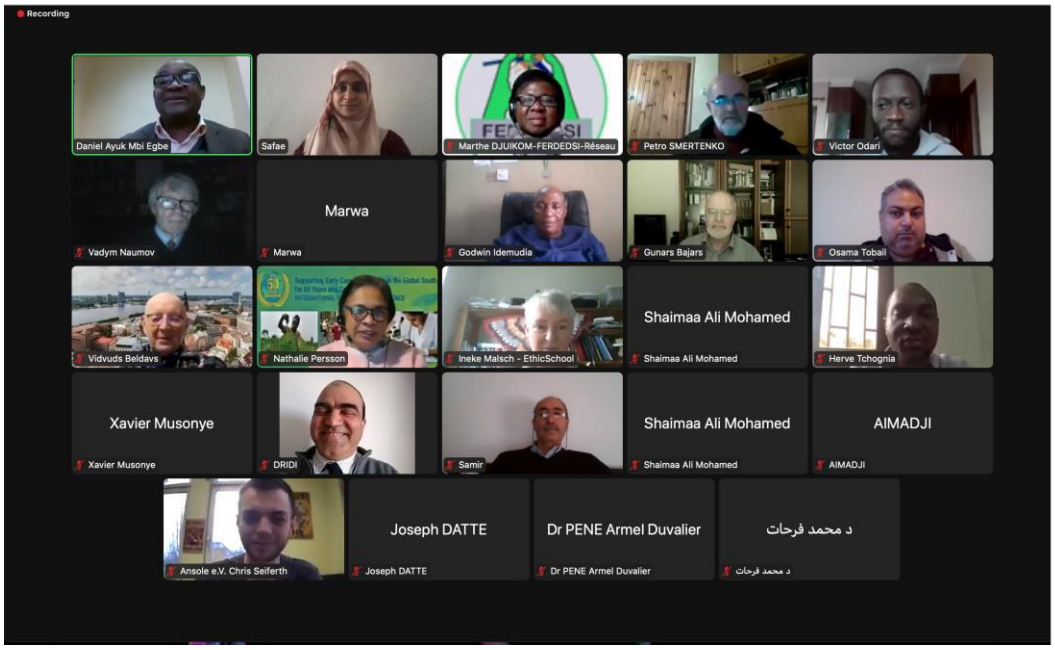
***Bank**: Sparkasse Jena-SHK.*

***IBAN**: DE52 8305 3030 0018 0256 68, **BIC**: HELADEF1JEN*

***Intended use**: A2IOC 2022+ full names of participant*

If bank transfer is difficult or expensive, other means such as PayPal, Western Union, etc can be used.

In total 44 persons registered to the event. 23 out of 25 planned lectures were held.



Screenshot of some participants of the online event

A birthday cake was baked by Chancily Matinda and shared among people present at the 2nd floor of Schillerstrasse 5, 07745 Jena.



Celebration of the 11th Anniversary of ANSOLE.

A conference declaration was prepared by Prof. Vidvuds and participants were asked to contribute to the declaration, which led to the final document found below. The various lectures can be watched here: https://diode.zone/my-library/video-playlists/7574c4f6-40e6-4c80-ac76-886c8618b869

A2IOC 2023 will be co-hosted by Kenya (Dr. Victor Odari) and Tunisia (Dr. Asmaa Saaidia). Nigeria, through Prof. Godwin Idemuda, has expressed the wish to co-host the 2024 edition together with Cameroon through Dr Jerome Ndam Mungwe.

Declaration of the Conference

Dedicated to the vision of Agenda 2063 "an integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in the international arena."

We came together to discuss technical, economic and policy choices available to Africa to advance renewable energy research, innovation, financing, and implementation to meet Sustainable Development Goals (SDGs) for Africa.

Our shared understandings:

We understand that the 6th African Union - European Union Summit will take place from 17-18 February 2022 with sustainable development and renewable energy priority concerns.

SDG7 calls for "ensuring access to affordable, reliable, sustainable and modern energy for all" to be achieved by 2030 and this goal is incorporated in the plans of the African Union, the EU, the UN, World Bank, and other international organizations and partners.

We are very concerned that the COVID-19 crisis has negatively impacted plans to achieve universal access to electricity by 2030 and that current forecasts by the IEA show 600 million people without access to electricity by 2030 of which 560 million are forecast to be in Sub-Saharan Africa, with most of them in rural areas.

Rising climate-change linked threats increase the vulnerability of people without access to electricity while access to electricity enables further development steps. It is extremely important that the AU and EU Partnership addresses this issue, taking all feasible measures to assure access to electricity for all in Africa by 2030.

The Africa-EU partnership, together with other international partners, member states, academia, NGOs, and business have the knowledge and the capacity to achieve SDG7 despite current, real-world forecasts of likely failure.

Education, training and other human development are critically important to address the electricity access challenge. The costs of solar energy conversion and storage systems are forecast to continue to decline and financing is available for any feasible energy project across Africa. People are needed to define, finance, and develop small and medium-scale (SMS) energy projects, focusing on rural areas.

Large renewable energy projects are being implemented at an increasing tempo purely based on business feasibility. The greatest challenge and greatest opportunity is across vast rural regions of Sub-Saharan Africa without infrastructure. Boot-strapping solutions with mini-grids using solar, wind, hydro and biogas to provide power have been demonstrated. People need to be educated to boot-strap and develop Small and Medium Scale (SMS) micro-grids that can open opportunities for a widening array of job-creating businesses, especially for the African Youth. This will contribute to mitigating emigration/immigration issues.

While focussed on the near-term goal of universal access to electricity in Africa by 2030 we need to be mindful of what needs to be done to achieve Agenda 2063 goals. Motivation to achieve the near term 2030 goals will be strengthened by awareness of how this enables meeting the greater challenges that lie ahead.

Finally, we would like to point out that one of the most powerful synergies is when photovoltaics is partnered together with water treatment technologies for the provision of clean drinking water – breaking out of the water-energy nexus paradigm. The gains made above with regard to SDG6 can leverage further impacts on a much wider range of SDGs including clean water (SDG6), gender equality (SDG5), education (SDG4) and health (SDG3). We believe that small-scale and modular technologies (photovoltaics, energy storage, and membrane filtration modules) enable technologies that can reach the remote populations of Africa who otherwise may not see an electricity gridor water distribution pipes in their village in this lifetime.

We recommend these actions:

- The EU Commission should develop a Sustainable Development Action corps (SDA) that would train and send qualified EU citizen-volunteers and African ex-pats to work with communities in Sub-Saharan Africa to develop job-creating micro-grid systems to provide access to affordable reliable electricity and create small business opportunities for those served.
- The AU Commission and member states should support the SDA.
- The AU Commission working with member states and their higher Education systems Institutions (HEIs) and universities in the EU, with support from the EU Commission develop training programs to provide sufficient human resources to enable universal access to electricity across Africa by 2030.
- The EU-Commission in partnership with the AU Commission should develop an EU-AU Partnership R&D program drawing on elements of the Horizon Europe research program to build long term research capacity in Africa linked to Sustainable Development Goals and Agenda 2063 aspirational goals. To address the human development challenge MSCA Actions, particularly the MSCA Staff Exchange, can be adapted to address research priorities of interest to both the EU and the AU such as improving solar energy conversion and related technologies – including energy storage and water treatment – to address the need to more rapidly develop access to electricity in Africa. In addition, the budget for building capacity in higher education in Africa under the ERASMUS+[1] programme should be increased to ensure significant impact on SDG 5: good quality education for all.
- The EU Commission, in Partnership with the AU Commission, should encourage production of equipment in Africa for energy conversion, energy storage and water treatment technologies – including providing research and innovation support. Bearing mind that Sub-Saharan Africa is a major source of critical materials for alternative energy technologies this would be in the long-term interests of both the EU and the AU.
- The Africa-EU Summit should consider continuation of the AEEP Topics and Activities.

[1] https://erasmus-plus.ec.europa.eu/

- Promote the production, in Africa, of energy conversion and energy storage equipment, considering that Africa is a major source of materials for alternative energy technologies.
- Review and Launch a Renewable Energy Cooperation Programme (RECP) to 2030 (RECP Strategy 2030)

- Within a RECP strategy 2030:
    - Continue to promote and increase funding for Renewable Energy Research and Innovation in African Higher Education Institutions (HEIs) between and amongst African and EU Researchers.
    - Encourage African member states to dedicate a reasonable share of their GDP to Renewable Energy Research and Innovation to build a long-term research capacity in Africa linked to the SDG and Agenda 2063.
    - Create a Platform for African NGO involve in Renewable Energy Research and Innovation.
    - Promote boot-strapping solutions: defining, developing, and financing Small and Medium Scale projects of Renewable Energies-powered mini grid for rural electrification in Africa, to expand opportunities for job-creating businesses, especially for African Youths, as a strategy to curb emigration of skilled people from the continent, long term research capacity in Africa linked to the SDGs and Agenda 2063.

ANSOLE will seek to review progress towards realization of goals and recommendations in this Declaration at subsequent conferences.

A^2IOC 2022 Conference Participants

List of participants at A^{2}IOC 2022

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CERTIFICATE OF PARTICIPATION

Issued to

Prof. Dr. Daniel Ayuk Mbi EGBE

for his participation and acting as main organizer of ANSOLE's 11th Anniversary International Online Conference (A²IOC 2022) on the 4th of February 2022, during which he lectured on "*ANSOLE: Activities and Achievements*". A²IOC 2022 was hosted by Université Mohammed V de Rabat, Morocco, and Zewail City of Science and Technology, Gizeh, Cairo, Egypt.

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Prof. Dr. Daniel A. M. EGBE
International Coordinator of ANSOLE & BALEWARE

11TH ANNIVERSARY
2011-2022

EVENT BOOKLET

4 FEBRUARY 2022

SUPPORTING INSTITUTIONS