13TH ANNIVERSARY
2011-2024

ANSOLE´s 13th Anniversary International Online Conference (A²IOC 2024)

Book of Abstracts and Biographies

ANSOLE

February 4th 2024


AYSOLE
13TH
ANNIVERSARY
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ANSOLE´s 13th Anniversary International Online Conference (A²IOC 2024), Sunday, Feb 4th, 2024

including

Reports on Erasmus+ Exchange of African Students at Johannes Kepler University Linz, Austria & STUBE-Ost Weekend Seminar on SDGs, 22-24.03.2024, Halle (Saale), Germany

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ANSOLE 13th Anniversary International Online Conference (A²IOC 2024)

Sunday, 4th February 2024, 3pm-9pm CET

In partnership with Riga Photonics Centre, Latvia

Co-Hosted by

UNIVERSITY OF BAMENDA (UBa), BAMENDA, CAMEROON

&

UNIVERSITY OF MASSACHUSETTS LOWELL (UMASS LOWELL), MASSACHUSETTS, USA

Given the ease of meeting online, ANSOLE celebrated its 13th anniversary by organising the ANSOLE 13th Anniversary International Online Conference (A²IOC 2024). A²IOC allows our members around the world to celebrate together and "talk science" from their living rooms. The 2024 edition was partnered by the Riga Photonics Centre, Latvia, and co-hosted by Dr Jerome Ndam Mungwe of the University of Bamenda, Cameroon, and by PhD candidate Ms Zita Ngagoum Ndalloka of the University of Massachusetts Lowell, USA.
Topics ranging from renewable energy, water, sustainability, green hydrogen, waste management, circular economy, green technologies, to climate change mitigation and beyond were welcomed. Recorded video of the event can be found here:

https://diode.zone/w/mE97Pa8TAUeqDR8drvam1o



Organizers

- Ms Zita Ngagoum Ndalloka, University of Massachusetts Lowell, USA
- Dr. Jerome Ndam Mungwe, University of Bamenda, Cameroon
- Mr Vidvuds Beldavs, Riga Photonics Centre, Riga, Latvia
- Prof. Dr. Daniel Ayuk Mbi Egbe, ANSOLE e.V., Jena, Germany

Logos of organizing & supporting institutions



























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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 since 2018 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 has embarked since 2022 in the documentation of the lifestories of people with migration background in Thuringia and beyond by publishing the magazine MIGRANTh (www.migranth.de).
ANSOLE members and those acting in the name of ANSOLE accept and act in accordance with the association's by-laws.
The by-laws of ANSOLE can be downloaded here:
https://www.ansole.org/download/2013-11-23-ANSOLE_Satzung_v02.pdf

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To carry out its various activities, ANSOLE acknowledges the support from:

- City of Jena
- Thüringer Ministerium für Migration, Justiz und Verbraucherschutz
- Thüringer Staatskanzlei
- Thüringer Landesverwaltungsamt
- Brot für die Welt
- MigraNetz Thüringen e.V.
- House of Resources
- World University Service Germany e.V.
- Stiftung Nord-Süd-Brücken
- Friedrich Schiller University Jena
- Studierendenwerk Thüringen

Programme

14:30 – 15:00	Entering the virtual room and networking
15:00 - 15:05	Welcome and organizational issues by **Prof. Daniel A.M. Egbe**, Chairperson and CEO of ANSOLE e.V.
15:05 – 15:10	Welcome address by **Profs. Samir Romdhane** & **Mammo Muchie**, ANSOLE cofounders, University Tunis-Elmanar, Tunisia &University of Pretoria South Afirca
15:10 – 15:15	Welcome address by **Dr. Vidvuds Beldavs**, Riga Photonics Centre, Latvia
15:15 – 15:25	Welcome addresses by **Dr. Jerome Ndam Mungwe** & **Ms Zita Ngagoum Ndalloka**, Cohosts of A^2IOC 2024
Session 1 **Chairperson: Ms Zita Ngagoum Ndalloka**	
15:30 – 16:00	*African Network for Solar Energy: 13 years after!* **Daniel A. M. Egbe**, African Network for Solar Energy, Jena, Germany
16:00 - 16:30	Energy Innovation Hubs to Accelerate Uptake of Renewable Energy Innovations in Rural Sub-Saharan Africa **Vidvuds Beldavs**, Riga Photonic Centre, Riga, Latvia
16:30 - 17:00	Plastic waste, inflammation and cancer: a Global Health Concern**, Graziella Rubino** *Institute for Tropical Medicine, University of Tübingen, Tübingen, Germany*.
17:00-17:30	Water and Infectious Diseases in Sub-Saharan Africa, **Anna Longdoh NJUNDA**, *Faculty of Health Sciences, University of Buea, Cameroon & Institute for Tropical Medicine, University of Tübingen, Germany*
Session 2 **Chairperson: Dr. Jerome Ndam Mungwe**	
17:30 - 18:00	Improving the performance of solar/diesel microgrids for rural electrification in Burkina Faso, **Daniel Yamegueu**, 2ie*, Ouagadougou, Burkina Faso*
18:00 – 18:20	Pan African Citizen Science e-Lab (PACS e-Lab): Fostering Astronomy Engagement in Africa**. Miracle Chibuzor Marcel**, *Pan African Citizen Science e-Lab, Obasanjo Space Center, Pyakassa Junction, airport road, Lugbe, Abuja, Nigeria*
18:20 – 18:40	Features of current-voltage characteristics of hybrid PV cells based on organic/silicon heterojunctions with plasmonic Au nanoparticles, **Vadym NAUMOV**, **Petro SMERTENKO**, *Institute of Semiconductor Physics, NAS of Ukraine, Kyiv, Ukraine*

18:40 – 19:00	Simulation and Optimal Modelling of an Air Trigenerator Using Numerical Methods: Finite Element and Finite Volume Methods. **Emmanuel Biba KALENGO,** *Mohamed V University of Rabat, Morocco*
Session 3 **Chairperson: Dr. Jerome Ndam Mungwe**	
19:00 - 19:20	Dam structural surveillance: Monitoring parameters to improve sata collection on structural behaviour and hydraulic safety**, Podie Boris Vibife**, *National Higher Polytechnic Institute, University of Bamenda, Cameroon*
19:20 - 19:40	Electrical and optical characteristics of UV light sensor based on Polymer/ZnO Nanorods: a Comparative Study, **Marwa Belhaj**, *NANOMISENE Laboratory, LR16CRMN01, CRMN of Sousse, Tunisia*
19:40 - 20:00	Numerical Simulation of an OTC/ED/EA Organic Heterojunction Solar Cell based on SCAPS-1D, **Souleymane TUO**, *University of Man (U-Man), Côte d'Ivoire*
20:00 - 20:20	Simulation of hydrogen production through the gasification of peanut shells under supercritical water conditions: Investigation of the effects of Ca(OH)2 catalyst, temperature, pressure, residence time and economic viability., **Souleymane MBAYE**, *WASCAL Accra, Ghana*
20:20 - 20:40	Evaluation of PV Module Output for Bambili Using Estimates of Hourly Irradiance and Temperature, **Yungho Edickson Bobo***, University of Bamenda, Cameroon*
20:40 - 21:00	**General debate and closing**

Time given is CET (Berlin)

African Network for Solar Energy: 13 years after!

Daniel A. M. Egbe
ANSOLE e.V., Wagnergasse 25, 07743 Jena, Germany

Brief overview about ANSOLE

- ANSOLE was initiated on 4 November 2010 in Sousse Tunisia by 9 African scientists based on the suggestion of Daniel A. M. Egbe and Samir Romdhane.
- It was launched on 4 February 2011 at the Linz Institute of Organic Solar cells, Johannes Kepler University, Linz, Austria. Daniel A. M. Egbe was appointed coordinator of the Network. Leslie Tobin (Scotland) designed the logo of ANSOLE with inputs from Profs Amel and Samir Romdhane.
- Constituent General Assembly of ANSOLE e.V. was held on 11th September 2011.
- The network was recognized as an NGO under the German association law by the local court of Jena, Germany. 26 January 2012 in the name of ANSOLE e.V.
- The Platform BALEWARE (Bridging Africa, Latin America and Europe in Water and Renewable Energies Applications) was initiated on the 29th of May 2015 in Curitiba, Brasil and was launched on 13th of December 2016 at the Nelson Mandela African Institute of Science and Technology (NM-AIST) in Arusha, Tanzania (www.baleware.org).
- ANSOLE e.V. has an office at Wagnergasse 25, 07743 Jena, Germany, since January 1st 2018. The office temporarily moved to Schillerstraße 5, 07745 Jena, Germany, due to renovation of the building at Wagnergasse 25. Its very first coworker was Ms Simona Fofie from Ghana.
- ANSOLE´s Energy Compact was accepted and published by the UN on 29 August 2022. Details of the compact can be read here: https://www.un.org/en/energycompacts/page/registry#AfricanNetworkforSolarEnergye.V.
- ANSOLE e.V. published the first issue of MIGRANTh (the magazine on migration and development) on 6th May 2023.
- Focus: Training, Education, Research & Deployment of Renewable Energies & Water in Africa
- ANSOLE has morethan 1200 members in 45 African countries and 31 non-African countries. Most of them are from morethan 300 Universities.
- It has (co)-organised so far 48 events in 17 countries (Algeria, Austria, Burkina Faso, Cameroon, Côte d´Ivoire, DRCongo, Egypt, Germany, Ghana, Kenya, Morocco, Nigeria, Rwanda, South Africa, Tanzania, Tunisia, Zambia)
- ANSOLE has graduated 14 PhDs and 1 MSc thru its 3 fellowship programmes funded by UNESCO through ICTP, Trieste, Italy (2012-2016), and the City of Utrecht, Dr. Ineke Malsch and Prof. Reinhold Lang.
  1. INEX (intra-African Exchange)
  2. ANEX (Africa-North Exchange)
  3. ANSUP (ANSOLE Sur-Place)
- Information dissemination through website, event publications, e-Magazine, social media, Theater for Development and mailing lists.
- Facilitation of research consortia
- Mediation of research laboratories



Daniel Ayuk Mbi EGBE is the initiator, chairperson and CEO of the African Network for Solar Energy. He 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 the Netherlands, and at the Technical University of Chemnitz, Germany. In 2009 he moved to the Johannes Kepler University (JKU) Linz, Austria, where he was first member of the Linz Institute of Organic Solar Cells (LIOS) (2009-2016) before joining the Institute of Polymeric Materials and Testing (IPMT) (2016-2021) and the Energy Institute at JKU Linz (2021-2022). Since April 2021 he is guest scientist at IPMT and the Institute of Polymer Chemistry (IPC) of JKU Linz. He is Honorary Professor of Organic Chemistry of the University of Rwanda since November 2021 and Extraordinary Professor of Renewable Energy at the Department of Chemistry, Material Science, Innovation and Modelling (MaSIM) Research Focus Area, North-West University, Mafikeng, South Africa since June 2022. Egbe's main research interest is the design of semiconducting materials for organic solar cells and other optoelectronic applications.

In addition to ANSOLE, he initiated the scientific platform BALEWARE (Bridging Africa, Latin America and Europe on Water and Renewable Energies Applications-www.baleware.org). He is a board member of the World University Service Germany e.V., an NGO advocating for human right for education. He speaks 6 languages and has published more than 130 peer-reviewed articles. Email: daniel.egbe@ansole.org

Energy Innovation Hubs to Accelerate Uptake of Renewable Energy Innovations in Rural Sub-Saharan Africa

Vidvuds Beldavs
Riga Photonics Centre, Riga, Latvia

Abstract

The context of our concern is the extreme urgency associated with rapid transition to green energy in sub-Saharan Africa (SSA) where 600 million people do not have access to an electrical grid which drastically impedes their development and access to vital services. Africa's population growth is explosive and underdevelopment breeds social discontent and pressures to emigrate. Far more urgent action is called for than is being presently contemplated.

1. Energy innovation hubs need to be developed in sub-Saharan Africa to accelerate financing and deployment of solar minigrids as well as to stimulate business development to enable rural communities in the SSA to not only gain access to electricity but to engage in productive economic activities that can pay for the electricity and the mini-grids operation and maintenance as well as to build the wealth and capabilities of the rural community.

2. African countries need to intensify and accelerate R&D of organic PV materials that would be suited to agrivoltaic applications in Africa which are much less energy-intensive to manufacture and less costly to dispose and recycle after useful lifetime and are can selectively filter light that favors growth of crops while blocking frequencies that heat and dry up the soil.
3. Africa needs to focus on the energy implications of Agenda 2063 for Africa to take full advantage of its human and natural resources by becoming the largest solar energy market in the world as well as the largest manufacturer of solar energy equipment and the world leader in solar energy research and development.



Vidvuds Beldavs, Special Projects – Riga Photonics Center-Convenor of sessions at the Science Summit at the UN General Assembly spanning sustainable energy, space policy, recovery of Ukraine's science capacity, and sustainable use of peatlands in Latvia. Convenor of sessions at the science Event at the US-African Leaders Summit December 2022, Until recently chairman of the Board of Directors of Riga Photonics Centre, Advisor to the African Network for Solar Energy (ANSOLE), Member of Board of Directors of Alliance for Cooperation in the Exploration of Space, Co-Founder of the International Lunar Decade Working Group; Chair of the International Conference on Cooperation in Space Technologies 2014 (ICCST) that promoted cooperation in space between the Baltic Sea Region and Africa; initiator and consultant to the International Baltic Economic Commission (IBEC) organized by Hudson Institute for Estonia, Latvia and Lithuania to develop an action plan to transition to market economies in 1990-1992. Prior service included business trends advisor for Cummins a global manufacturer of power systems, Vice President – Intelligent Resources International, Executive Director Technology Transfer Society, other roles including publishing, and founded several not-for-profit organizations – US-Africa Literary Foundation to promote African writers, New Leaf-New Life (criminal justice reform Bloomington, Indiana), Futuristics Study Group (community futures forum in Columbus, Indiana). American citizen semi-retired in Latvia. Email: vid.beldavs@fotonika-lv.eu

Plastic waste, inflammation and cancer: a Global Health Concern

Graziella Rubino
Institute for Tropical Medicine, University of Tübingen, Tübingen, Germany.

Abstract
Despite the fact that climate action, global health and sustainability fall under the main objectives of the Sustainable Development Goals (SDGs), these remain unresolved.
Consistently, plastic waste continues to be a global problem for fauna and flora, with approximately 400 million tonnes of plastic being released globally each year; more than 1000 rivers appear to be responsible for 80% of global annual plastic emissions into the oceans (Meijer et al., 2021). While plastic items may be used for a short period of minutes or seconds, they can take up to 500 years to decompose.
Africa also bears a disproportionate share of the global waste burden. As waste management is linked to the consumption of bio-resources, especially water,

recycling is a particular challenge for regions with limited access to water. Rapid global warming and subsequent desertification could dramatically alter the future geographical distribution of potable water and other bioresources needed for waste recycling.

Chemical additives to plastics, such as bisphenols, cadmium and other heavy metals, are not only hazardous to the environment but can also harm human health. Exposure to microplastics can cause inflammation and irritation in both humans and animals (Qiao et al., 2019; Hirt and Body-Malapel, 2020). In particular, some microplastics containing bisphenol A (BPA) can also trigger immune responses in humans, with adverse effects on immunity. Accidental exposure through drinking water contamination is likely to be the primary route of human exposure to bisphenols. Experimental studies of gut microbiota and mucose-associated immune T cells (MAIT) have shown that BPA exposure can alter microbial metabolism and directly modulate immune cells (Krause et al., 2022). In murine studies, BPA affects the Th1/Th2 balance; in prenatal stages it can also reduce the number of regulatory CD4+ T cells (Yan et al., 2008). Similar findings have been reported in other in vitro studies of PBMC (Gosner et al., 2015). Of note, BPA can decrease mitochondrial DNA copy number and telomerase activity in activated CD8+ T cells (Tran et al., 2020).

In mammals, inhalation, ingestion and dermal exposure to microplastics have been associated with embryotoxicity, cytotoxicity, oxidative stress and DNA damage (Yang et al., 2022; Kumar et al., 2022; Emenike et al., 2023). In addition, endocrine disrupting effects induced by bisphenol exposure are well known (Vandenberg et al., 2007; Pivonello et al., 2020; Vom Saal et al., 2021; Lee et al., 2023). This is probably due to the low binding affinity of bisphenols for the estrogen receptors ERα and ERβ. It is important to note that breast cancer is the most common cancer in the world and has a huge impact on the number of cancer deaths worldwide. A causal link between bisphenols and an increased risk of triple-negative breast cancer has also been established (Liu et al., 2023). In rats, fetal exposure to

exposure to BPA leads to the development of mammary carcinomas with significantly increased preneoplastic lesions and intraductal proliferation (Gomez et al., 2017).

In conclusion, in the fight against the current throwaway culture and given the impact of plastics on both the environment and human health, it is of utmost importance to promote public awareness of these issues and to increase sustainability, e.g. by supporting upcycling initiatives and a more conscious use of plastics. Meanwhile, collaborative efforts to develop and implement multidisciplinary and international strategies to address this global problem remain urgent.

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Dr. **Graziella Rubino** is an Italian biologist. She obtained her PhD magna cum laude in Human Immunology (Alma Mater: Eberhardt-Karls Universität von Tübingen, Germany). Her PhD project - a collaboration between Germany, Italy and the USA - was funded by the Deutscher Akademischer Austauschdienst (DAAD) and focused on inflammation. She is currently employed at the University Polyclinic in Tübingen, where she works mainly in the field of vaccine research and clinical trials. Email: graziella.rubino@uni-tuebingen.de.

Water and Infectious Diseases in Sub-Saharan Africa

Anna Longdoh NJUNDA

Faculty of Health Sciences, University of Buea, Cameroon & Institute for Tropical Medicine, University of Tübingen, Germany. *Email: ann_njunda@yahoo.com*

Abstract

Water is one of life's most precious liquids. Every human being at any stage of development consists of no less than 60% water. Water, along with shelter and clothing, are the UN's three basic requirements for every sovereign state's citizens. Sub-Saharan African countries suffer from water scarcity, whether for agricultural, economic or domestic consumption. This makes their populations vulnerable to many water-borne infectious diseases. Bacterial infections such as cholera, salmonella and campylobacter are easily transmitted. Fungal infections such as aspergillosis, candida and cryptococcus are also common. Parasitic infections such as schistosomiasis and paragonomiasis continue to plague the population. Stagnant and fast-flowing untreated water is a breeding ground for parasitic vector-borne infections such as filariasis and malaria. Households need water, and the lack of water increases the transmission of faecal oral pathogens such as protozoan cysts and helminth eggs. Unclean water used for household activities can lead to secondary diseases. This leads to individuals having mixed infections of bacterial and/or viral or fungal or parasitic infections. Development activities such as the construction of dams and wells lead to water stagnation and the introduction of some waterborne infections into the surrounding population. A sick population weakens the political, economic and social activities of the country. The sources of water for domestic, agricultural or economic activities should be clean and safe for the consuming population.

Key words: Water, infections, Sub-Saharan Africa



Njunda Anna Longdoh attended a Roman Catholic primary school, where she obtained her First School Leaving Certificate, and went on to the prestigious Our Lady of Lourdes College Mankon Bamenda, where she obtained her Ordinary Level Certificate. She then went on to the Cameroon College of Arts Science and Technology. After passing her Advanced Level with flying colours, she won the Cameroon Government Scholarship which took her to the University of Lagos, Nigeria. She obtained her PhD in Medical Microbiology and Parasitology from the University of Lagos, Nigeria. She is a Lecturer with the rank of Professor. She has served as Head of the Department of Medical Laboratory Sciences and Vice Dean for Programmes and Academic Affairs. She has been the Coordinator of Postgraduate Studies of the Faculty and is currently the Vice Dean in charge of Studies and Student Affairs. She works on rare infectious diseases and tries to clear up some simple misunderstandings about some basic concepts in the diagnosis of tropical disease infections. Her work ranges from studies on genital mycoplasma, correct diagnosis of salmonella, schistosomiasis, basic knowledge of malaria diagnosis. She works with rare infectious diseases of bacterial, fungal and viral origin. She is particularly interested in their interactions and other diseases caused by physiological disorders such as diabetes. She is currently a research fellow at the Institute of Tropical Medicine, University of Tübingen, Germany. She is a member of both local and international scientific organisations. She has presented some of her scientific publications through posters and oral presentations at conferences in Cameroon and abroad. She enjoys mentoring, walking, nature observation and writing. Email: ann_njunda@yahoo.com

Improving the performance of solar/diesel microgrids for rural electrification in Burkina Faso

Daniel Yamegueu
Laboratoire Energies Renouvelables et Efficacité Energétique (LabEREE), Institut International d'Ingénierie de l'Eau et de l'Environnement (2iE), Ouagadougou, Burkina Faso

Abstract
Solar/diesel microgrids are becoming increasingly popular in rural areas of sub-Saharan Africa where the national grid is often inaccessible. Economic considerations often result in the exclusion of storage systems in the hybrid solar/diesel power plants deployed in rural areas of Africa. This is the case in Bilgo village in Burkina Faso, where a solar/diesel microgrid without a battery storage system has been implemented. The operational efficiency of solar power plants faces challenges in grid management due to continuous fluctuations in solar output and loads. This raises the question of whether integrating battery energy storage systems could improve the grid's performance. This study examined three scenarios based on the characteristics of the existing microgrid: conventional stand-alone diesel generators, solar/diesel without battery storage, and solar/diesel with battery storage, which are the main technologies used for off-grid rural electrification in Burkina Faso. The economic performance of each scenario was assessed using the Levelized Cost of Electricity (LCOE), calculated with the HOMER software. The study found that the PV/diesel/Battery configuration is the best among the scenarios considered, with the lowest LCOE of US$ 0.524/kWh. The battery storage system for the optimal configuration has a capacity of 182 kWh with approximately 8 hours of autonomy. This study suggests that a storage unit is necessary for optimal management of a solar/diesel microgrid. The storage unit reduces operating and maintenance costs associated with running diesel generators and excess electricity. Additionally, it allows for a substantial reduction in CO2 emissions when compared to systems without storage.

Keywords: Micro-grid, Diesel generator, Photovoltaic system, Energy Management, Battery storage, Levelized Cost of Electricity.



Dr. **Daniel YAMEGUEU** is an energy engineer who graduated from the International Institute of Water and Environmental Engineering (2iE) in 2009. He obtained a PhD in Engineering Sciences with a specialisation in Energy from the University of Perpignan (France) and the 2iE Institute in 2012. He also holds a First Certificate in Project Management from ISMAN (France). He has been a lecturer in Energy Engineering and Photovoltaic Systems since 2013. He has held several positions of responsibility at 2iE, including Deputy Director of Training in charge of the Bachelor's cycle in 2014, Coordinator of the project "Sustainable electricity production for rural and peri-urban populations in Africa: development of the flexy-energy concept" funded by the European Union between 2014 and 2016, Head of the Solar Energy and Energy Saving Laboratory from 2014 to 2018. Since September 2019, he is in charge of the Scientific Knowledge Management and Valorisation

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Pan African Citizen Science e-Lab (PACS e-Lab): Fostering Astronomy Engagement in Africa

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Abstract
The PACS e-Lab is a platform that allows the public to participate in citizen science projects in astronomy, including asteroid search, exoplanet research, astro photo visual development, and astronomy research writing. The PACS e-Lab aims to promote space science and astronomy education and skills development in Africa, with a focus on underrepresented countries and groups. The PACS e-Lab uses robotic web telescopes, including the Micro Observatory, the Las Cumbres Observatory, and the Slooh telescopes, to conduct collaborative research projects and provide live training in data acquisition, analysis, image processing, and research writing. The PACS e-Lab is a diverse and inclusive community with a network of teachers, students, and astronomy enthusiasts across Africa and beyond. A presentation on this topic can be found here: https://youtu.be/2R0Qute-C6w?si=v2EIMcy4FDL4oRpy



Mr **Miracle Chibuzor Marcel** is the founder and director of the Pan African Citizen Science e-Lab (PACS e-Lab). He is an independent astrophysics researcher with interests in stellar astrophysics, planetary astrophysics, cosmology, and astronomy education and outreach. You can check out his publications on Google Scholar and also connect with him on linktr.ee (https://linktr.ee/Miracle_Chibuzor_Marcel). *Email: miracle.c.marcel@gmail.com*

Features of current-voltage characteristics of hybrid PV cells based on organic/silicon heterojunctions with plasmonic Au nanoparticles

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Abstract
Modern photovoltaic (PV) technology faces two main challenges: (i) increasing the efficiency of PV solar cells, and (ii) reducing the cost of PV cell production [1]. Our research is focused on hybrid organic-inorganic PV cells that use self-organization of thin films of organic molecules on nanostructured substrates. Hybrid PV cells

based on heterocyclic amines (HCA) were fabricated and deposited on patterned silicon substrates using aqueous solutions [2, 3]. This simple and cost-efficient technique was used to fabricate nanocomposite PV cells based on HCA/Si heterojunctions with plasmonic metal (gold) nanoparticles (Au NPs) [4, 5]. This report presents the features of the current-voltage characteristics (CVC) for photovoltaic (PV) cells, aiming to determine the main effects of plasmonic Au NPs in hybrid organic-inorganic nanostructures. The fine structure of CVC was studied using the method of dimensionless sensitivity (DS), which allowed us to identify the ranges of monomolecular or bimolecular recombination of charge carriers, the exponential dependences of CVC, and other relevant factors [5]. The experiments involved using clonidine (CLO, C9H9Cl2N3) as a functional HCA, and two types of n-Si substrates: flat silicon (Si) and porous silicon (PSi). Two sets of samples were examined: 1) Si + CLO and Si + CLO + Au NPs, and 2) PSi + CLO and PSi + CLO + Au NPs. The dark CVC for flat Si substrates showed that the classical bimolecular recombination with DS = 1.5 is replaced by the monomolecular recombination at double injection in the dielectric with DS = 3 upon the addition of a CLO layer. The use of gold nanoparticles (Au NPs) results in a current limitation upon contact with DS = 1. In the case of porous silicon (PSi) substrates, double injection dominates in the dielectric for monomolecular recombination with DS = 3 in all cases, except for structures with added CLO layers, where the current increases exponentially. The CVC curves exhibit exponential behaviour at low bias in all cases. Specifically, $I(V) \propto \exp(V1.5)$ for flat Si substrates and $I(V) \propto \exp(V)$ for PSi substrates. The CLO layer consistently promotes carrier injection, while Au NPs restrict the current, particularly in the case of flat Si substrates. In relation to the reverse dark response, it is important to note that no rectification was observed for flat Si samples. However, the samples with the CLO layer and Au NPs had a sublinearity of DS ≈ 0.7. Among the PSi samples, only PSi + CLO samples exhibit a sublinearity of DS ≈ 0.6, which is a prerequisite for good PV cells. The dominant charge transfer mechanism is current limitation due to the double injection in the dielectric with monomolecular recombination with DS = 3. Ongoing research is being conducted.

Keywords: photovoltaic solar cell, thin-film nanotechnology, hybrid organic-inorganic nanostructure, plasmonic gold nanoparticles, heterocyclic amines, silicon substrates, self-organization, current-voltage characteristics, dimensionless sensitivity analysis

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Simulation and Optimal Modelling of an Air Trigenerator Using Numerical Methods: Finite Element and Finite Volume Methods

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Abstract
The Energy engineer's strength lies in producing energy in compliance with environmental standards. Trigeneration is a process that simultaneously produces electricity, heat, and cold from a single primary source, such as natural gas. The gas turbine generates electricity, and the heat is recovered through a series of heat exchangers to optimize primary energy consumption. The absorption refrigerators use all or part of the heat to produce cold.
The objective of this work is to contribute to economic growth by addressing the issues of conduction and thermal diffusion. To achieve this, we studied heat transfer in the 3D boiler and its outlet before reaching the turbine using finite element and finite volume methods. We observed that the temperature profile at the outlet of the stainless-steel boiler is linear, which enhances its ability to withstand thermal stresses in the gas-solid interfaces. Magnetic and active coal treatments were proposed as potential solutions for mitigating pollutant emissions in the environment.

Calculations were performed to evaluate the system's performance based on our design. The model operates with a natural gas flow rate of 1.5 Kg/min and 760 mol/min of air, producing 376 KW of electric power, 237.5 KW of thermal power, and 138.5 KW of cooling power while preserving 16% of primary energy. Additionally, the system offers 19% CO2 savings and benefits from 6 green certificates.

Keywords: Trigener, Optimization, Modeling, Simulation, RANS method, Energy, Heat, Cold …



A graduate of the University of Kinshasa (D.R. CONGO) in energy engineering, Mr **Emmanuel BIBA KALENGO** is a proven teacher and researcher. He is a trainer and an active member of several engineering networks. He is currently pursuing his Master's degree in Space Sciences and Technologies at the Mohammed V University of Rabat (MOROCCO). He is working on the modelling of enclosures for energy production while respecting environmental standards. His research focuses on renewable energies, water sciences, remote sensing and geographical information systems, mathematics and programming for engineers. Email: emmanuel_bibakalengo@um5.ac.ma

Dam structural surveillance: Monitoring parameters to improve sata collection on structural behaviour and hydraulic safety

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Abstract
The importance of technical parameters and early monitoring systems for ensuring the structural integrity of dams and associated structures cannot be overstated. Acquiring maximum data in real-time regarding various aspects of the dam's actual state allows for the assessment of the structure's proper functioning while ensuring environmental safety.
To assess, mitigate, and control the effects of dam structures on humans, their activities, and cohabiting ecosystems, engineers focus on technical aspects such as triaxial displacement, interstitial fluid piezometers, groundwater interactions, and structural inclinations.
The collected data presents the current state of our structure and the forces acting upon it. Having real-time data on the behavior of these massifs allows us to be proactive in avoiding disasters and designing safety protocols in case of safety concerns.



Podie Boris Vibife, is a student of Mining and Mineral Engineering at the National Higher Polytechnic Institute of the University of Bamenda in Cameroon.
Born and raised in the western region of the country, he was inspired by the breathtaking view of the natural geological formations, the vegetation and the evolving mix of semi thatched houses and widely spaced clustered neighbourhoods whose inhabitants are agriculturally inclined. The seemingly stationary giant fireflies that radiate their light into each home, attempting to mimic Mother Nature's sun at the end of each day, ignite a multitude of questioning sparks deep within the core of a growing African child about the possibilities and technologies required to harness nature's most precious trophy. Fueled by this flame, he embarked on an academic journey not only to find the sources of raw materials needed to produce the energy that brings smiles to faces and drives infrastructural and socio-economic development, but also to ensure that the massive structures put in place to harness this power are environmentally friendly and pose minimal risk to the inhabitants and nature itself. Armed with hands-on experience from a series of steps in the professional domain of mining and renewable energy, the most recent being a 6-month internship at the NACHTIGAL HYDROPOWER PLANT (7*60MW) in the central region of the country. Satisfying his passion of finding and answering to the challenges faced by sustainable development aspects in the fields of Mining and Renewable Energy Engineering. Email: Pdboris97@gmail.com

Numerical Simulation of an OTC/ED/EA Organic Heterojunction Solar Cell based on SCAPS-1D

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Abstract
The objective of this research is to identify specific material properties conducive to the design of active layers in OTC/ED/EA heterojunction solar cells, utilizing organic compounds as a sustainable alternative to the traditionally silicon-based photovoltaic cells. This study meticulously examines the impact of various parameters, including layer thickness, energy gap, and the densities of ND donors and NA acceptors within the active layers, on the cell's operational efficiency.
Utilizing SCAPS 1D, a numerical simulation software, we meticulously evaluated the performance of the cell, taking into account the role of temperature variations on its efficiency. Our findings reveal a significant influence of all examined physico-chemical parameters, except for donor density, on the cell's performance metrics.
The experimental setup involved exposing the cell to the AM1.5G solar spectrum, with an incident radiation intensity of 100 mW/cm^2, at an initial temperature of 300 K. Under these specific conditions, the solar cell demonstrated optimal performance, achieving a maximum efficiency (η) of 15.04%, accompanied by a short-circuit current (J_SC) of 14.3 mA/cm^2, an open-circuit voltage (V_OC) of 1.19 V, and a fill factor (FF) of 88.5%.

These promising results underscore the potential viability of fabricating organic solar cells based on the material parameters identified in this study, highlighting the significant opportunity for advancements in the field of renewable energy technologies.

Keywords*: Material properties, Organic solar cell, Heterojunction, Simulation, SCAPS 1D.*



Mr **Souleymane TUO** is Senior Assistant, Teacher-Researcher at the University of Man, Côte d'Ivoire. He obtained his Ph.D. in 2018 at the Felix Houphouët Boigny University of Abidjan, Côte d'Ivoire, under the joint supervision of the University of Nantes, France. His thesis topic was "*Realisation of indium-free transparent conducting electrodes in organic photovoltaic solar cells*". Prior to his thesis, in 2010, he obtained his Diploma of Advanced Studies by defending the topic "*Use of new transparent conducting oxides as anodes in thin film organic solar cells: challenges and performance improvements*". In 2011, he passed the entrance exam to the National Pedagogical Institute for Technical and Vocational Education of Côte d'Ivoire and graduated as a high school teacher in electrical engineering in 2013.
He was able to graduate as a high school teacher thanks to the Master in Science and Technology he obtained in 2007 by defending his thesis on "*Design of an access monitoring system based on the 16F84A microcontroller*".
His research activities focus on photovoltaic energy and in particular on organic photovoltaic solar cells. In addition, he is involved in the supervision of Master's and Diploma theses for engineers.
He has participated in several scientific symposia such as

- ✓ 2nd ANSOLE Scientific Meeting in Côte d'Ivoire (ASMCI 2019) March 28, 2019, Université Nangui Abrogoua, Abidjan, Côte d'Ivoire.
- ✓ International Day of Light, Yamoussokro, May 2019
- ✓ 4th annual RESER scientific days (RESER-JSA04-23), November 08 to 10, 2023 at INP-HB in Yamoussoukro, Analysis and evaluation of wind energy potential in Côte d'Ivoire: Case of the Tonpki region (Man)

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Electrical and optical characteristics of UV light sensor based on Polymer/ZnO Nanorods: a Comparative Study

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Abstract
Self-powered photodetectors (PDs) convert light signals into electrical signals through a photon-matter interaction mechanism that involves the generation, separation, and transportation of electron-hole pairs in the active media. The collected carriers are then collected by the electrodes. Hetero-structured photodetectors (PDs) are a rapidly growing field of optoelectronic sensing for designing high-

efficiency and high-responsivity ultraviolet PDs. High-performance hybrid photodetectors that combine the solution processability of polymers with the high electron mobility of inorganic components are highly desirable for a wide range of applications, ranging from optical communications to chemical detection [1, 2].
In this study, we introduce and compare different hybrid heterojunction photodetectors with polymers and a 1D ZnO nanorod (NR) array as the electron donor and acceptor, respectively. The synthesis of ZnO NRs was achieved through a low-temperature, two-step hydrothermal method on dip-coated ZnO seed layers on an n-type silicon substrate. Ohmic contacts to the polymer film and Si substrate were made using graphite and eGaIn, respectively. The effect of polymer deposition on the optical and structural device properties was also investigated. Basic electrical parameters for the eGaIn/Si/ZnO/polymer/graphite structure were calculated from I-V characteristics under dark and various power illuminations. The devices demonstrate varying sensitivity to UV light illumination with a high degree of reproducibility. The photoconductivity properties of the ZnO/polymer device have been explained through the carrier transport mechanism at interfaces.

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Evaluation of PV Module Output for Bambili Using Estimates of Hourly Irradiance and Temperature

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Abstract

The photovoltaic (PV) module's performance and energy output forecasting are contingent upon the accurate estimation of irradiance and temperature parameters. However, these data are frequently obtainable only in proximity to meteorological stations, thereby limiting their applicability to neighboring locations. The primary aim of this study was to predict and quantify irradiance and temperature utilizing mathematical models, and subsequently calculate the energy output of BP3125 and BP3180 PV modules. To achieve this, mathematical models including Amstrom-Prescott, Kaplanis, Duffie and Beckman, and Collares et al. were utilized for

irradiance estimation, while Wave, Soygro, Parton, and Logan Models were employed for temperature calculations. A comparative analysis of the estimated data with NASA meteorological data revealed that the Collares et al. model demonstrated efficacy for irradiance prediction, and the Parton and Logan models proved suitable for temperature prediction from 6 am to 12 noon, with the Soygro model being effective from 1 pm to 6 pm for the Bambili region. Employing the irradiance and temperature data derived from these models, the monthly and annual energy output of the selected PV modules were calculated for Bambili using Hay's anisotropic model. The estimated annual energy output results exhibited a strong correlation with those of PVGIS and PVsyst, with root mean square error percentage values of 1.95, 4.4 for BP3125 and 2.14, 4.22, for BP3180 respectively. These findings suggest that the Collares et al., Soygro, and Hay's anisotropic models can be effectively used in conjunction with BP3125 and BP3180 PV modules for the estimation of energy output in Bambili and other locations where meteorological data/stations and internet services are unavailable.

Keywords: Irradiance, Temperature, Photovoltaic Energy, PVsyst/PVGIS



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Simulation of hydrogen production through the gasification of peanut shells under supercritical water conditions: Investigation of the effects of $Ca(OH)_2$ catalyst, temperature, pressure, residence time and economic viability.

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Abstract
The subject matter pertains to the Arachis hypogaea, commonly known as the peanut, a leguminous plant of the Fabaceae family. This plant is a significant agricultural commodity, particularly in tropical regions such as Senegal, and holds substantial value within the agro-industrial sector. Post-harvest and processing stages, the peanut shells, while not edible, are often discarded as waste, posing a significant global

challenge. This study introduces a theoretical design for the catalytic supercritical water gasification of these discarded peanut shells.
A comprehensive Power Law kinetic simulation model was engineered utilizing ASPEN Plus V14 software to scrutinize, enhance, and assess the efficiency of the peanut shell supercritical water gasification process. The developed model encompasses three distinct process units responsible for pretreatment, gasification, and subsequent separation and purification.
The financial viability of the optimized process was appraised using hydrogen derived from the supercritical gasification of peanut shells, employing a thorough discounted cash flow analysis (DCF). The simulation outcomes were corroborated by juxtaposing them with empirical data available in existing literature, revealing a strong agreement between the model's predictions and previously reported results.
An analysis of sensitivity was conducted to examine the primary and interactive effects of four process parameters - temperature, pressure, catalyst loading, and residence time - on the yield of syngas. The results indicated that escalating the temperature from subcritical (300°C) to supercritical (1000°C) conditions augmented the production of H2 and CO, while concurrently decreasing the production of CH4 and CO2. Furthermore, an increase in pressure from 220 to 350 bar resulted in improved yields of H2 and CO2, and a reduction in CH4 and CO production. However, alterations in pressure did not exhibit a significant impact on hydrogen yield.
Notably, the investigation of the $Ca(OH)_2$ catalyst revealed its positive influence on H2 yield, enhancing hydrogen production by 16.308%. To optimize hydrogen production, the concurrent impact of various process parameters on hydrogen yield was studied. The model predicted a maximum hydrogen yield of 193.993 kg/h under the following conditions: temperature = 750°C, pressure = 220 bar, biomass to water ratio of 1:4, and a residence time of one hour.
The economic analysis estimated the Levelized cost of hydrogen (LCOH) at $1.30/kg, a relatively low cost compared to hydrogen produced from other biomass conversion processes, primarily due to the abundant availability of the feedstock. Additionally, the analysis yielded an internal rate of return of 12%, a payback period of 4.6 years, and a return on investment of 113.30%, with a net present value of $11,839,892.99. The profitability analysis suggests that the supercritical water gasification (SCWG) project for hydrogen production is economically feasible.

Keywords: Process simulation, Peanut shell, Hydrogen, Supercritical water gasification, Aspen Plus ®, Economic Analysis.



Souleymane Mbaye, a native of Senegal, embarked on his academic journey in his home country. He earned a Bachelor's degree in Physics from Cheikh Anta Diop University in Dakar, Senegal, where he developed a keen interest in the intersection of science and sustainable energy solutions. Driven by his dedication to advancing his knowledge, Mbaye pursued the prestigious WASCAL (West African Science Service Centre for Climate Change and Land Adapted Use) international master program in energy and green hydrogen (IMP-EGH). He received a scholarship for this program. In 2023, Mbaye graduated from the international master program under WASCAL at the University of Lomé, specializing in Bioenergy, Biofuels, and Green Hydrogen Technology. This academic journey equipped him with comprehensive insights into cutting-edge technologies that drive environmental sustainability. Beyond academia, Mbaye actively contributed to the field as the Chief Communications Officer (CCO) of WAGEDO (West African Green Energy Development Organization). In this role, he played a pivotal part in communicating the organization's mission and initiatives, fostering collaboration, and advocating for sustainable practices in the realm of green energy development across West Africa. Mbaye's passion for merging science with environmental responsibility continues to drive his endeavors. He strives to make meaningful contributions to the ongoing discourse on sustainable energy solutions. Mbaye looks forward to embracing new challenges and opportunities that allow him to make a positive impact in the realm of green energy and beyond. Email: mbaye.s@edu.wascal.org

Biographies of other Participants of A^{2}IOC 2024



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Mr **Koffi Joseph DATTE**, is a Doctor of Physics from the University Félix Houphouët Boigny, Cocody-Abidjan, Côte d'Ivoire, after having obtained a Master's degree in Electrical and Electronic Systems a few years ago. He holds a degree in Educational Sciences from Ecole Normale Supérieure Abidjan, Côte d'Ivoire. In 2017, he attended an ANSOLE summer school at 2IE in Burkina Faso. In 2018, he was a member of the scientific meetings of ANSOLE in Côte d'Ivoire (ASMCI). In August 2019, he participated in the photovoltaic summer school on metrology and failure analysis of solar panels at the Institut National Polytechnique Félix Houphouet-Boignyn (INP-HB). He was a participant in the 77th and 78th United Nations sessions with the ANSOLE network. He is currently a teacher-researcher at the Ecole Normale Supérieure Abidjan. His field of research is photovoltaic material conversion and he is interested in optoelectronics, organic solar cell construction and thin films. Email: dattjos73@gmail.com



Jerome Ndam Mungwe holds a Ph.D. in Science Technology Energetics and Nuclear (STEN) from the Politecnico di Milano, Italy. Prior to his PhD studies, he obtained an M.Sc. in Energy Systems and Management from the University of Flensburg, Germany. His core professional value/belief is integrity in the application of engineering solutions to improve human living standards, especially in rural areas of developing countries. He has professional experience as a practitioner, researcher in renewable energy technologies and as an academic. As a practitioner, he has designed and supervised the construction of micro-hydropower plants in some rural areas of Cameroon, designed and installed several home solar PV systems and home biogas systems. His research achievements include 9 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 7 international conferences. Professionally, he was a secondary school teacher (1998 -2006), technical advisor in renewable energy with an NGO in Cameroon (2008 -2010), assistant lecturer at the School of Engineering at the Catholic University of Cameroon-Bamenda (2010 -2019). He was a lecturer at the National Higher Polytechnic Institute of the University of Bamenda (2019-2020) and is currently a Senior Lecturer at the Higher Technical Teachers Training College of the University of Bamenda, where he is Head of the Department of Renewable Energy Engineering, Head of Service for Training and Internship. Furthermore, he is a member of the Scientific Committees of the Departments of Electrical and Power Engineering, HTTTC and Electrical and Electronic Engineering of the National Higher Polytechnic Institute of the University of Bamenda. Email: mungwe.jerome@polimi.it



Professor **Mammo Muchie** received his undergraduate degree from Columbia University, New York, USA, and his postgraduate MPhil and DPhil in Science, Technology and Innovation for Development (STI&D) from the University of Sussex, UK. He currently holds the DST-NRF Research Chair in Innovation Studies at the Faculty of Engineering and the Built Environment, Tshwane University of Technology, as a rated research professor. He is a Fellow of the South African Academy of Sciences, the African Academy of Sciences and the African Science Institute. He is currently an Adjunct Professor at Bahir Dar University and the University of Gondar, Ethiopia, and a Senior Research Associate Fellow at the TMD Centre, Oxford University and the Africa Centre of Excellence in Data Science, University of Rwanda. He has taught as a visiting professor at the University of Economics, Prague; Jawarahal Nehru University, India; Tonji and Shanghai Universities, China; Honorary Professor, Jiaxing University, China; Assistant Professor, Amsterdam University; Visiting Professor, Carleton College, USA; Principal Lecturer, Middlesex University; Professor, Aalborg University; Adjunct Lecturer, Cambridge University; Honorary Professor, UNISA. Professor Mammo has held various positions around the world, including Director of the Research Programme on Civil Society and African Integration at the then University of Kwa Zulu-Natal; Board Member of North Western University, Chengdu, China. He is currently Chairman of the Advisory Board of the African Talent hub of the Community Interest Company (registration number 10461990) to raise funds to make Africa the talent, innovation, entrepreneurship, creativity and knowledge hub of the world. He has been appointed Special Distinguished Advisor to the African Union Student Council and Mentor for the African Entrepreneurship Award. He initiated the African Unity for Renaissance and Knowledge Exchange. He is a founding member of the African Network for Solar Energy (ANSOLE), founding chair of the network of Ethiopian scientists. He has led the SIDA, Sweden funded research on engineering design and transformative innovation for African integrated development and is actively engaged in public media education to accelerate the creation of an innovative and resurgent Africa. He is also a co-founding member of the Nano Technology Institute at TUT, leading the innovation side of the research. He is the founder and editor-in-chief of the African Journal on Science, Technology, Innovation and Development (AJSTID), launched in 2008. *He is also the founding editor of the Journal of Creativity, Innovation and Social Entrepreneurship (JCISE) and the Ethiopian Electronic Journal on Research and Innovation Foresight (Ee-JRIF)*. He has been appointed as a scientific and academic advisor to the local e-governance research involving ten African countries on ICT4D. He has been appointed as a consultant to the UNESCO Forum on Higher Education, Research and Knowledge. He has served as a postdoctoral mentor in the NRF National Postdoctoral Forum. Since 1985, he has produced over 500 publications including books, chapters in books, articles in internationally refereed journals and contributions to institutional publications. Prof Muchie has received a number of awards: long service and valued service awards, best institutional senior researcher of the year merit, academic excellence award, and outstanding contribution to science, engineering, technology (SET) and innovation by the NTSF in South Africa. He has been invited to deliver

many keynote addresses and lectures in Africa and around the world. Prof Muchie has undertaken the mammoth task of producing an impressive body of research on the innovation systems (in whatever rudimentary form or degree of development they exist) in various African countries. He is the founder of the Africana Post-Graduate Academy, which has trained Masters and Doctoral students from different disciplinary backgrounds using the Unity of Knowledge approach to improve the quality of supervision. He has taught many doctoral candidates in doctoral academies around the world in the Globelics, Africalics, Cicalics, Indialics networks. He has taken major initiatives to run doctoral and Masters academies in various universities in Africa and around the world. Email: mammo.muchie2019@gmail.com



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



Awangum Noel Nkwa holds a Master of Engineering degree in Electrical and Electronic Engineering from the National Higher Polytechnic Institute of the University of Bamenda and is currently pursuing his Master of Science degree at the same institute. He is committed to providing engineering solutions to societal problems. With his experience in renewable energy, he has designed and installed several solar PV systems to provide electricity to homes in both rural and urban communities. In line with his interest in research in the field of renewable energy, he has published a research article titled "Low-Cost Automated PV Panel Dust Cleaning System for Rural Communities" and is currently conducting research on forecasting solar PV power in the NW region of Cameroon using machine learning techniques. He is also currently a lecturer at the National Higher Polytechnic Institute of the University of Bamenda, Cameroon. Email: noelnkwa@gmail.com



Jean Pierre WOUMO DJAMGA holds a Master's degree in Renewable Energy from the University of Douala in Cameroon. He also has a Postgraduate Diploma in Technical Teacher Training - Training of Trainers, with a focus on Mechanical Manufacturing. Currently, he serves as an instructor at the University of Bamenda (HTTTC Bambili) and is a member of the NGO Hope For a Better Future (H4BF). He has six years of experience in secondary education and sixteen years of experience in the university system, with a total of 22 years of work experience in the field of Technical, Vocational Education and Training (TVET). He possesses knowledge of Humanitarian Principles and Protection from Sexual Exploitation and Abuse. Additionally, he has worked as a TVET expert in Zambia and the Democratic Republic of Congo (RDC). Email: woumojean@yahoo.com



Taah Patience Tifuh holds a Master of Engineering in Electrical and Electronics Engineering (EEE) from the National Higher Polytechnic Institute of The University of Bamenda. She has developed a strong interest in Renewable Energy Systems, both in academic and practical contexts. As a professional, Tifuh is an Electrical and Electronic Engineer and serves as a university instructor at the University of Bamenda. Her field experience includes designing and installing PV lighting systems, PV-powered pumping systems, and micro-hydro systems in both rural and urban communities. With a robust engineering foundation, her research interests lie in the specialized field of photovoltaic systems. Motivated by the transformative potential of solar energy in power generation, she is dedicated to expanding her expertise in this domain. Tifuh was a participant in the African Young Energy Fellowship Cohort 2, a program aimed at enhancing Africans' theoretical, technical, and financial understanding of renewable energy. At present, she is pursuing a Master of Science focused on Fault Diagnosis in Photovoltaic systems using Machine Learning. Concurrently, she continues her role as an instructor at the National Higher Polytechnic Institute of The University of Bamenda. Email: patiencetifuh@gmail.com.



Dr. **Rahimat Oyiza Yakubu** is a distinguished scholar who recently earned her Ph.D. in Sustainable Energy Technologies from Kwame Nkrumah University of Science and Technology, Ghana. Her strong background in electrical and electronics engineering is supported by her bachelor's and master's degrees in the same field.

Dr. Yakubu boasts a wide range of expertise, with research interests that encompass Renewable Energy Technologies, Energy Policy, and Power System Analysis. Her doctoral research focuses on the intricate design, modeling, and technical evaluation of various solar photovoltaic systems, including monofacial and bifacial PV modules.

In addition to this, Dr. Yakubu's work involves the performance assessment of both off-grid and grid-connected PV systems, examining various configurations such as rooftop installations, ground-mounted arrangements, and innovative floating PV

systems. Her dedication to the advancement of sustainable energy solutions is demonstrated by her thorough investigation of solar technologies across diverse applications. Email: rahimayakubu@gmail.com



ACHA Cynthia is the Founder of SolarCity Cameroon. She is an alumnus of the Africa Fellowship for Young Energy Leaders (AFYEL) 2024 cohort. She's passionate about solar energy and the development it can bring to Cameroon, especially to underserved communities. She has developed a model that shows how switching between two energy sources can be automated, sending wireless GSM information to the user about the switch and how much energy the previous source consumed. She is a member of Women in Renewable Industries and Sustainable Energy (WRISE), Smart Energy Council, WomenTech Network and Women In Renewable Energy (WIRE). She holds a Master's degree in Electrical Engineering from the Institut Universitaire de la Cote and a Bachelor's degree in Applied Physics from the University of Buea. Email: achacynthia@outlook.com



Dr. **Dirk Schweitzer** is a chemist whose interest in the field developed through mineralogy. His doctoral thesis focused on understanding the role of metal ions in biological systems. After completing the total synthesis of a marine natural product, he has worked on both bio-based and biodegradable polymers, the latter to reduce plastic pollution. Having improved a full-colour thermal printing medium, he is now synthesising high-purity, next-generation chemicals for the electronics industry. His personal interests include educating the public about the serious dangers of global warming and advocating concrete actions that, if implemented, would reduce its severity. Dirk can be contacted via his LinkedIn profile: https://www.linkedin.com/in/dirkschweitzer/



Prof. Dr. **Felista TANSI**, currently Principal Investigator at the University Hospital of Jena and Lecturer at the Friedrich Schiller University of Jena, holds a German M.Sc. in Biology and a Ph.D. in Biochemistry from the Free University of Berlin and the Charité - Universitätsmedizin Berlin. After several years of postdoctoral research, she habilitated in Molecular Medicine at the Friedrich Schiller University of Jena in 2021. Her research interests include nanotechnology, image-guided drug delivery, intraoperative imaging and hyperthermia treatment of various cancers in preclinical models. Following the trend of artificial intelligence, she is currently involved in projects that promote the establishment of AI models to advance clinical diagnosis and therapy of cancer, such as the

ARTEMIS project (European Union HORIZON RIA programme). Email: Felista.Tansi@med.uni-jena.de



Dr. **Daniel Wamwangi** is an Associate Professor in the School of Physics at the University of the Witwatersrand. He studied physics at Kenyatta University and RWTH-Aachen and completed his PhD in 2004 with a thesis entitled "Application of p-electron theory to predict new materials for rewritable optical recording". Following a post-doctoral position at the 1st Institute of Physics 1A of New Materials, RWTH-Aachen, he conducted intensive research on the development of novel materials for electronic phase change random access memory, resulting in two international patents. In 2009 he moved to the University of the Witwatersrand where his group is currently investigating the physical properties of novel solid state materials for energy and information storage applications. His current research interests in energy materials include; organic solar cells, plasmonics, magnetoplasmonics and thermoelectrics. He has published over 40 papers on these topics. Email: daniel.wamwangi@wits.ac.za



Dr. **Philip Amuyunzu Mang'are** is a physicist specialising in electronics and biophysics. He holds a PhD in Physics from Egerton University. He is an experienced teacher and lecturer in many institutions including but not limited to Moi University and Masinde Muliro University of Science and Technology. He has published extensively and contributed to and organised many conferences and workshops. Philip Amuyunzu has also participated in many international conferences and training sessions. He is currently the Founder and President of the Society of Africa Biophysical Societies (SABS), which promotes the uptake of physical and biological sciences in Africa (sabsafricabiophysics.org). He is an Ambassador of the Biophysical Society and President of BPS Kenya. (https://www.biophysics.org/). Email: philipamuyunzu@gmail.com

Report on ANSOLE 13th Anniversary International Online Conference (A^2IOC 2024), Sunday, Feb 4th 2024.

Link to event video: https://diode.zone/w/mE97Pa8TAUeqDR8drvam1o

This report was done using Zoom AI support by:
Dr Jerome Ndam Mungwe, *Department of Renewable Energy, Higher Technical Teachers Training College (HTTTC), University of Bamenda, Bamenda, Cameroon*
&
Ms Zita Ngagoum Ndalloka, *University of Massachusetts Lowell, USA*



Prof. Dr. Daniel A. M. Egbe, host of the event, speaking to the participants of A²IOC 2024

Introduction

ANSOLE celebrated its 13th anniversary in the form of an online event, ANSOLE 13th Anniversary International Online Conference (A²IOC 2024). A²IOC 2024 was hosted by Prof. Dr. Daniel Ayuk Mbi Egbe, chairperson and CEO of ANSOLE. During the conference various topics were discussed, including waterborne diseases in Africa, plastic waste, and the potential of Africa's natural resources, particularly solar energy. Prof Daniel A.M. Egbe emphasized the importance of collaboration and service provision. Other speakers in the introductory addresses included Vidvuds Beldavs, who discussed the progress and funding issues of a project related to energy innovation hubs in Africa, Dr. Jerome Ndam Mungwe, who shared his experiences and career trajectory, and Zita Ndalloka, who talked about empowering young women in the African energy sector. Daniel also shared the history of ANSOLE and its accomplishments. Further discussions were held on the energy sector in Africa, innovation, water scarcity, and the importance of integrating storage into microgrids. The meeting concluded with a question-and-answer session.

Welcome Addresses and Organization issues

Prof. Daniel Ayuk Mbi Egbe, Chairperson and CEO of ANSOLE e.V, welcomed everyone to A²IOC 2024, a recurring event since 2021. He acknowledged the contributions of Riga Photonics Centre, partnering the event and the co-hosting Universities, the University of Bamenda-Cameroon and the University of Massachusetts Lowell, Massachusetts-USA, various attendees, the support of colleagues and friends, for the success of the A²IOC 2024. He mentioned that this year's celebrating together and "talk-science" involves talks on waterborne diseases in Africa and plastic waste and of course Solar Energy and Technologies. He highlighted that the annual anniversary of the ANSOLE network which was initiated on the 4th of November 2010 continues to inspire positive change in solar energy and sustainable development, especially in Africa. He went on to share the history of ANSOLE, celebrating its 13th anniversary, and discussed the activities and accomplishments of this UN-recognized network: https://www.un.org/en/energycompacts/page/registry#AfricanNetworkforSolarEnergye.V.

Prof. Egbe then passed the microphone to two other co-founders of ANSOLE, Prof. Samir Romdhane and Prof Mammo Muchie. Prof. Romdhane emphasized the potential of Africa's abundant natural resources, particularly solar energy, to generate free electricity, while Prof. Muchie stressed on the importance of working collaboratively and valuing service provision. Mr. Vidvuds Beldavs, of Riga Photonics Centre, Latvia, in his welcome address, discussed the progress made on solar innovation hub related project and expressed frustrations over a funding issue. Dr. Jerome Ndam Mungwe, cohost of the event from the University of Bamenda, in his welcome address shared his experiences in career trajectory and involvement with ANSOLE, and finally, Zita Ngagoum Ndalloka, cohost of the event from the University of Massachusetts-Lowell, shared her work in empowering young women in the African energy sector and invited further support and collaboration.



Prof. Mammo Muchie, cofounder of ANSOLE, gives a welcome address.

Session 1

The first session of the A^{2}IOC 2024 was chaired by Ms Zita Ngagoum Ndalloka of the University of Massachusetts Lowell. Four presentations were programmed for this session.

Discussion on African Energy and Corruption

The first presentation in the first session was by Prof. Daniel Ayuk Mbi Egbe, who discussed the concept of blessings and their relationship to the second law of thermodynamics, emphasising the importance of giving rather than keeping. He linked this concept to the fact that ANSOLE's activities are centred on being a blessing to others. He thanked his supporters and highlighted the energy crisis in Africa, stressing the need to address this issue in order to achieve the goals set out in Agenda 2063. Daniel also criticised corruption in African leadership and society and called for greater independence and self-determination in African countries. The challenges and opportunities in Africa's energy sector were also discussed, with a focus on the need for innovation to address the continent's energy paradox. Vidvuds Beldavs stressed the importance of innovation for the common good.

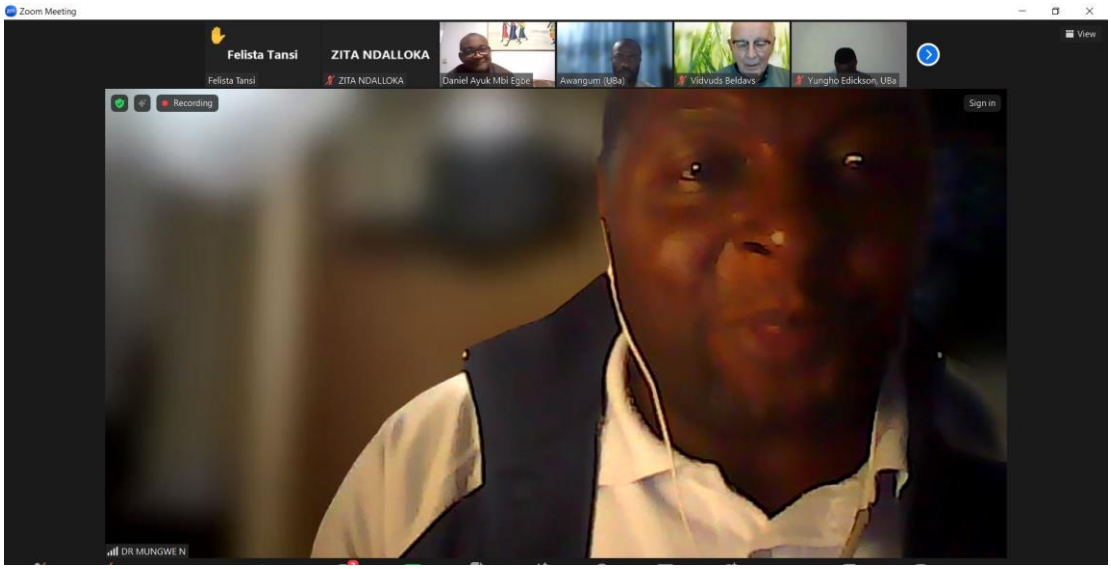
Innovation and investment in African countries

The second presentation in this session was by Dr Vidvuds Beldavs, who discussed the state of innovation in African countries, noting that Morocco, Tunisia, South Africa and Mauritius are leading in terms of innovation. He emphasised the need for increased investment in R&D, with Kenya targeting 2% of GDP for R&D by 2030. Vidvuds also highlighted the potential of mini-grids for electricity access and the issue of brain drain. He presented the concept of an Energy Innovation Hub, a one-stop shop providing expertise and services to help people make decisions about their energy systems. He discussed the submission of proposals for the Smart

African Communities project, which aims to bring knowledge to people lacking infrastructure, with a focus on energy. The discussion ended with an open question and answer session.

Water scarcity and disease transmission in sub-Saharan Africa
Dr Anna Longdoh NJUNDA, of the University of Buea, Cameroon, and the Institute of Tropical Medicines, University of Tübingen, Germany, was the third speaker in session 1. She presented the critical role of water in the transmission of infectious diseases, particularly in sub-Saharan Africa. She emphasised that water is essential for the human body and its role in disease transmission. Dr Njunda highlighted the issue of water scarcity in sub-Saharan Africa, where women and children are most affected and have to wait in long queues for their turn to fetch water. The discussion also focused on the health impacts of contaminated food and water, including a range of health issues such as liver cancer, diarrhoea and fever. Solar energy for water purification was suggested as a possible local solution by Dr Mungwe J.N and Daniel Ayuk Mbi Egbe. The importance of innovation and acceptance of locally developed technology was also emphasised.
The fourth person to present in this session, Dr Graziella, had IT related technical challenges to present and therefore her presentation was postponed to a later time.

Session 2



Dr Jerome Ndam Mungwe is chairing sessions 2 &3.

This session was chaired by Dr Jerome Ndam Mungwe of the University of Bamenda. Four presentations were scheduled for this session.

Integrating storage and solar energy in sub-Saharan Africa
The first presentation was by Prof Daniel Yamegueu of 2ie Ouagadougou, Burkina Faso. Prof Yamegueu discussed the importance of integrating storage into microgrids, particularly in Burkina Faso, and emphasised the critical need for access to electricity in sub-Saharan Africa. He also highlighted the potential of solar energy and the need for off-grid solutions due to limited grid coverage in rural areas. He then discussed the challenge of universal energy access in Africa, emphasising the potential of off-grid solutions and the importance of considering local resources, such as the potential use of hydropower in Cameroon.

Prof Yamegueu discussed the energy situation in sub-Saharan Africa, particularly in rural areas. He emphasised the need for mini-grid systems in rural areas, where some villages have no access to energy for up to a week. At the end of his presentation, a question was raised about the nature of the project being discussed. He clarified its status and the need for system optimisation, in particular the integration of a storage unit in a rural facility located in the village of Bilgeo in Burkina Faso. He clarified that the technical team, having operated the facility for some time, agreed that the integration of a storage unit would be a step towards system optimisation.

Pan African Citizen Science e-Lab (PACS e-Lab)
The second presentation was to be given by Miracle Chibuzor from the Pan African Citizen Science e-Lab. Knowing that he wouldn't be able to attend, Miracle submitted a video recording of his presentation. Prof Daniel Egbe tried to play the recording of his presentation but due to technical difficulties it was not possible. There was no sound. Prof Egbe promised to share the internet link to Chibuzor's presentation. Link to the presentation: https://youtu.be/2R0Qute-C6w?si=v2EIMcy4FDL4oRpy

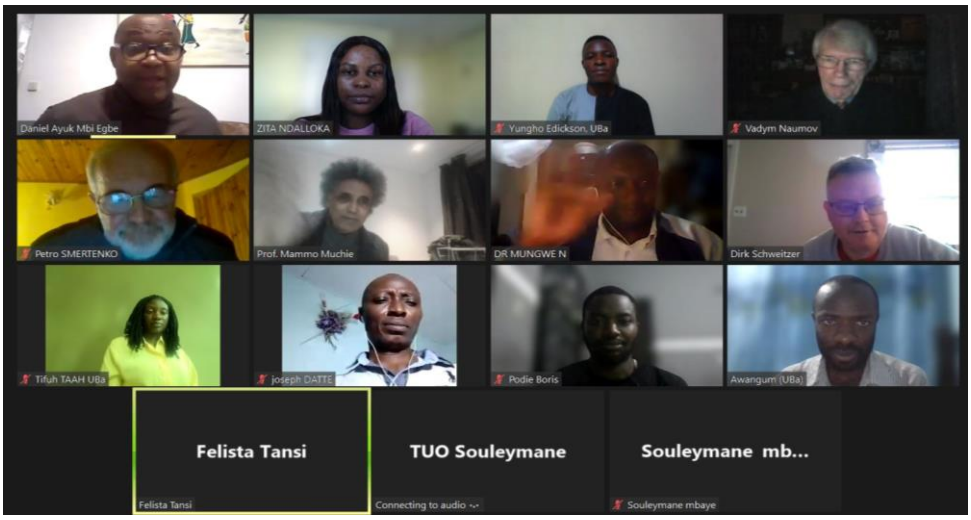
Characteristics of the current-voltage characteristics of hybrid PV cells
The third presentation in session 2 was given by Vadym Naumov and Petro SMERTENKO of the Institute of Semiconductor Physics, NAS of Ukraine, Kiev-Ukraine. They started their presentation with an account of the Ukrainian-Russian war, showing some pictures of residential buildings bombarded by Russia. The participants shared their concerns about the events in Ukraine. They then presented the characteristics of the current-voltage characteristics of hybrid PV cells based on organic/silicon heterojunctions with plasmonic Au nanoparticles. Petro Smertenko, emphasised the use of inexpensive organic materials and the self-organisation of syntheses at room temperature. He also discussed the use of plasmonic metal nanoparticles and a new method for diagnosing current-voltage characteristics.

Simulation and Optimal Modelling of an Air Trigenerator
The fourth presentation in this session was given by Emmanuel Biba Kalengo from Mohamed V University Rabat-Morocco. He discussed the simulation and optimal modelling of an air trigenerator using numerical methods such as finite elements and volume elements. The discussion covered the implementation of a totemic lead generation, the reduction of gas machines in a planetary system and the design of energy production simulation. He highlighted the role of the Chibo machine in energy exchange or conversion. Emmanuel also explained the use of the finite element method to modify the system and the importance of using a mesh in Lagrange interpolation. He also discussed the process of obtaining and analysing temperature values from each point in the system. Emmanuel BIBA KALENGO discussed the analysis of a system using various methods including the Fourier equation and the method of volume. He highlighted the role of auxiliaries within the system and the potential for direct reaction of oxidation. Emmanuel also discussed the environmental impact of their system and the proposed measures to reduce emissions. The discussion concluded with Prof Daniel Ayuk Mbi Egbe expressing his appreciation for Emmanuel's presentation and emphasising the importance of English language training.

Plastic waste, inflammation and cancer
The final presentation in this session was given by Dr Graziella Rubino from the Institute of Tropical Medicine, University of Tübingen, Germany. Dr Rubino was

unable to present in the first session, so she was given the opportunity to present in the second session. She discussed the impact of plastic waste on inflammation and cancer, emphasising the global problem of plastic waste. She highlighted the dangers of chemical additives to plastics, particularly bisphenols, to both the environment and human health. The discussion concluded with Prof Daniel Ayuk thanking Dr Rubino for her insightful presentation and noting the need for people to be more aware of these aspects.
The session ended with Dr Mungwe thanking all the presenters for their participation.

Session 3
This session was chaired by Prof Daniel Ayuk Mbi Egbe. Five presentations were scheduled for this session. The Chair invited Dr Mungwe to assist in the running of the session.



Some participants of the event

Simulation of hydrogen production from peanut shells: Economic Viability and Future Prospects
Due to technical difficulties, the first three presenters were unable to present, so Souleymane Mbaye of WASCAL Accra Ghana, who had been programmed to present in the fourth position, was given the honour. His presentation focused on the simulation of hydrogen production using peanut shells under supercritical water conditions. He examined various factors such as the effect of Ca(OH)2 catalyst, temperature, pressure, residence time and economic viability. He outlined the objectives, methodology and results of the research, which included the potential of the process for hydrogen production and economic analysis. He then discussed the importance of the peanut in the Senegalese economy and the potential benefits of using the discarded shells. He presented a model and its validation with experimental data, observed the effect of temperature and pressure on hydrogen content and discussed the role of catalysts. He concluded that the process is economically viable, with a positive net present value and a short payback period. Souleymane Mbaye suggested further studies on the impact of continuous CSTR control and a detailed economic analysis combined with a life cycle assessment. Questions were raised about the potential use of peanut waste in hydrogen production and the prospects for green hydrogen in Africa.

PV Module Output Evaluation for Bambili and Renewable Energy in Cameroon
The second presenter during this session was Engr. Yungho Edickson Bobo from the National Polytechnic Institute (NAHPI) of the University of Bamenda (UBa). He presented on "Evaluation of PV Module Performance for Bambili Using Estimates of Hourly Irradiance and Temperature". His presentation emphasised the importance of reliable performance prediction for PV system sizing and economic feasibility. He discussed data sources for irradiance and temperature and reviewed related work on mathematical models for predicting irradiance and temperature. Yungho also presented various models for estimating temperature and irradiance for specific geographical locations, particularly in Bambili. He also discussed the results of comparative analysis of different models. At the end of his presentation, discussions centred on the increasing use of renewable energy systems, particularly solar PV, in the North West Region of Cameroon and the need for community involvement in the renewable energy activities of the University of Bamenda. Concerns were raised about the availability and quality of solar PV systems in Cameroon, leading to discussions about standardisation, quality control and capacity building in the solar PV industry in the country.

Electrical and optical characteristics of UV light sensor
The third presentation in this session was given by Marwa Belhaj from the NANOMISENE Laboratory, LR16CRMN01, CRMN of Sousse, Tunisia. The title of the presentation was "Electrical and Optical Characteristics of UV Light Sensor based on Polymer/ZnO Nanorods: a Comparative Study".

Numerical Simulation of an OTC/ED/EA Organic Heterojunction Solar Cell based on SCAPS-1D
This fourth presentation was given by Souleymane TUO of the University of Man (U-Man), Côte d'Ivoire, on Numerical **simulation of an OTC/ED/EA organic heterojunction solar cell based on SCAPS-1D.**

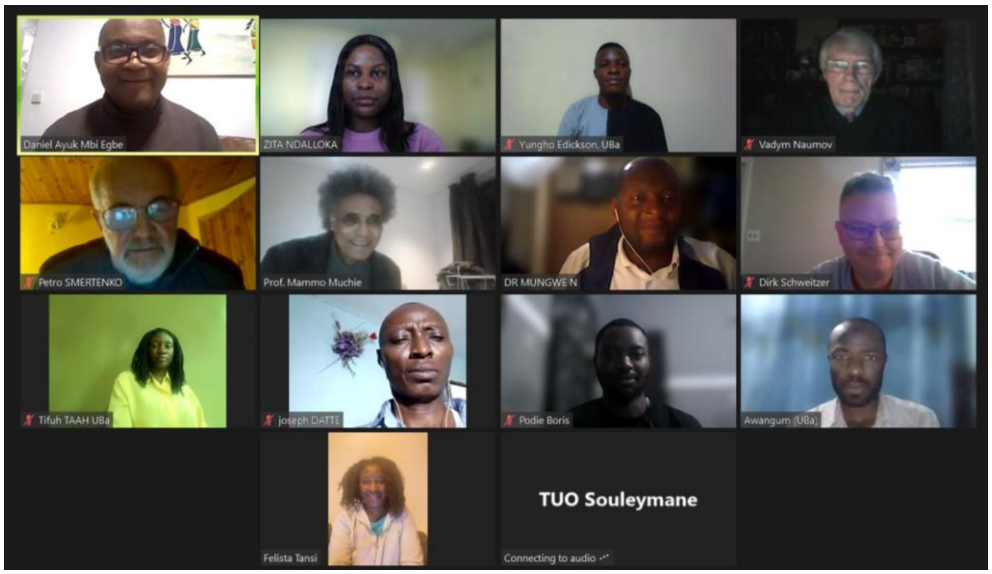
Dam structural surveillance: Monitoring parameters to improve sata collection on structural behaviour and hydraulic safety.
The final presentations of this session by Podie Boris Vibife could not be made due to poor internet connection.

General Debate and closing

Energy Solutions for Africa: A Grand Initiative

The ensuing debate at the end of the presentation focused on Energy Solutions for Africa.
On the issue of plastic waste and its consequences. Prof. Daniel Ayuk Mbi Egbe discussed the problem of the western world using Africa as a dumping ground for plastic waste, and stressed the need for interdisciplinary solutions.
On Energy Solutions for Africa, he proposed the idea of producing a manual on solar panel installation and capacity building in local languages. Prof. Mammo Muchie suggested a collaboration between ANSOLE and Osiri University, focusing on the development of new courses and research. The team then discussed the importance of capacity building in Africa and suggested the creation of a manual to support solar PV installation and education. They also proposed a major initiative to harness solar energy across Africa, believing it could be a solution to the continent's

electricity needs. The meeting focused on discussing energy challenges and solutions, particularly in sub-Saharan Africa.



Those who stayed till the end!

Future Actions by ANSOLE

- Vidvuds will submit a proposal for Energy Innovation Hubs at the end of February, aiming to work with 3 different universities in Africa, with an initial focus on Kenya.
- Prof. Daniel Egbe will send Boris' PowerPoint presentation to the conference participants.
- Produce a manual on PV system design and installation for technicians.
- Develop a manual on PV system awareness and capacity building for users.
- Form a team to develop these manuals, including young engineers and students.
- Daniel will communicate the idea of developing a manual to the group of solar experts in Cameroon and consider expanding the group.

University World News Report of 14.03.2024 on the event: https://www.universityworldnews.com/post.php?story=20240312134634502&utm_source=newsletter&utm_medium=email&utm_campaign=AFNL0441

Some impressions of the ANSOLE´s 13th anniversary celebration held on the 20th of February 2024 at ANSOLE e.V., Schillerstraße 5, 07745 Jena, Germany











The 13th anniversary was actually celebrated on 20 February 2024 with an anniversary cake offered by Mrs Anja Hort Dewald. The cake was made by two Ukrainian sisters, Natalia Balabat and Katharina Balabat.



Natalia Balabat is 21 years old and was born in Rivne, Ukraine. She trained as a bartender in Ukraine and worked as a bartender for 1.5 years until the war with Russia broke out in 2022. At the beginning of the war, she fled to Germany with her older sister Katharina Balabt and her mother, who had cancer, in the hope that her mother could be cured in Germany. Unfortunately, her mother died 7 months ago. Now she and her sister Katharina are all alone in Jena and are trying to build a new life for themselves. The two young women have had their own flat since 1 March. They are currently attending a German course. Email: nataliabalabat66@gmail.com



My name is **Katharina Balabat**, I am 23 years old and, like my younger sister Natalia, I was born in Rivne in Ukraine, where I lived until the outbreak of war in February 2022. I trained as a chef in Ukraine and worked in this profession for 4 years. My sister, my mother and I came to Jena in Germany as war refugees in 2022, where our mother died of cancer on 18 July 2023. I am currently attending a German course and trying to build a new life with my sister. My sister and I baked a cake for the 13th birthday of ANSOLE e.V. on behalf of Mrs Anja Hort, as Mrs Hort wanted to make Prof Daniel A. M. Egbe happy.



Anja Hort Dewald was born in January 1974 in Kazakhstan in the former Soviet Union. As a Russian-German, she moved to Jena in East Germany at the age of 16 at the time of reunification (1989). She trained as an optician at Jenoptik and then as a dental assistant. She currently works as a dental assistant in Lobeda-West, Jena, and advises refugees from Ukraine every week in the Lobeda-West neighbourhood office. She is generally committed to helping refugees from Eastern Europe. She is the mother of 2 sons. She donated the cake for ANSOLE e.V.'s 13th birthday party. We are very grateful to her for this. E-mail: anjahort@gmx.net



Daniel A. M. Egbe cutting the anniversary cake (left) & together with Rea Mauersberger (right)

Erasmus+ Exchange MSc students from Ghana and Kenya at Johannes Kepler University Linz, Austria, thanks to ANSOLE!

From February to June 2024, a first batch of 6 MSc students from Africa, 3 from Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana (Emmanuella Brown Fasinu, Emmanuella Buerki Nelson, Joshua Atta Alabi) and 3 from the Dedan Kimathi University of Technology (DeKUT), Kenya (Edith Cherotich, Enock Kiprono Ngeny, Goeffrey Muchiemi Mitambo) are participating in an Erasmus+ exchange programme at the Institute of Polymeric Materials and Testing (IPMT), Johannes Kepler University (JKU), Linz, Austria. ANSOLE facilitated the exchange by liaising between JKU and the 3 African partner universities involved in this programme during the funding application process. The second cohort of students visiting JKU will be mainly from Multimedia University (MMU), Nairobi, Kenya.
On 19 March 2024, Prof. Daniel A. M. Egbe visited the students and had an exchange with 5 of the 6 students. Prof Gernot Wallner of the IPMT is thanked for arranging the meeting.



Group photo on March 19th, 2024: Prof. Daniel A. M. Egbe and exchange students

The 3 Ghanaian students have joined the ANSOLE network!
Below are the short biographies of the 6 students and a short report from one of them:

E. Cherotich´s Report on Erasmus+ Exchange Program at JKU, Linz, Austria

Edith Cherotich, MSc Chemistry Student
Home Institution: Dedan Kimathi University of Technology, Kenya. ***Exchange Institution*:** Institute of Polymeric Materials and Testing, JKU, Linz, Austria

The opportunity to travel to Austria was a lifelong dream that fulfilled the dream of not only being outside Kenya but also visiting Europe! With Vienna as my gateway, I embarked on a journey that would immerse me in Austrian culture, history and nature. Arrival in Austria was marked by the seasonal change from winter to spring, which for me was still very cold.



Figure 1: The first weeks after arriving in Austria.

The experience in Austria so far will be an memorable one. In general, the population speaks German, which is bound to cause a language barrier, but thanks to the Johannes Kepler University, an intensive German course was organised for the international students as soon as we arrived. The limited German vocabulary makes communication easy. The Erasmus+ students from Africa are a great help, because being around them makes you feel at home.



Figure 2: Left: Photo with Linz social workers and other exchange students at Glückstraße, Linz, during cultural sensitivity training; right: Photo with international students studying in Vienna, at the Postlingberg viewpoint, Linz.

The International Office of Johannes Kepler University organised interactive sessions and events that helped us connect with other exchange students from other countries such as USA, Mexico, France, China, India, Spain, Italy and other countries around the world. The events ensured an exchange of cultures from all over the world.

I would like to thank Dedan Kimathi University of Technology, Kenya through the International Office and the Erasmus + programme for giving me the opportunity to be in Austria. It is a great opportunity to experience life in Europe, interact with different cultures and most importantly to gain skills in polymeric materials and characterisation at JKU Linz. I urge other students to take advantage of these opportunities offered by the International Office so that they can also benefit from the tremendously enriching experiences that exchange can provide.
Finally, I would like to thank our host Prof. Gernot Wallner and the IPMT for their constant support and ANSOLE for making this exchange possible.



Figure 3: Photo with other Erasmus+ students at JKU learning center.



Ms **Edith Cherotich** is an ambitious individual from Kenya. She completed her Bachelor's degree in Industrial Chemistry at the Dedan Kimathi University of Technology (DeKUT), Kenya. After completing her bachelor's degree, she embarked on a career as a laboratory technician in the science department at Salabwek High School, Kenya (Oct 2021 - Feb 2023). She is currently a student on the Erasmus + Exchange Programme at Johannes Kepler University (JKU), Linz, Austria. She is also pursuing a Master of Science in Chemistry at DeKUT, Kenya. Her research focus is mainly on sustainable materials in the construction industry with a special emphasis on the synthesis of geopolymer cement for various applications in the construction industry. She also works as a graduate assistant at DeKUT, sharing her expertise and mentoring the next generation of chemists. Based on her research area, Edith has an unwavering commitment to making a positive impact on the construction industry by developing an environmentally friendly building material. Her dedication to academic pursuits drives her towards academic excellence and distinction in her chosen field. Email : edithcherotich18@gmail.com

Biographies of other African Erasmus + Exchange Students



Joshua Atta Alabi is a highly motivated research enthusiast and a native of Ghana. He is currently enrolled as an Erasmus+ exchange student in the Masters in Management in Polymer Technologies at Johannes Kepler University in Austria, where he is immersing himself in the intricate world of polymers and their diverse applications in the field of renewable energy. This programme was made possible by ANSOLE, an initiative to promote education and research in renewable energy and water-related issues in Africa. He completed his BSc in Materials Engineering at the Kwame Nkrumah University of Science and Technology in Ghana, where he discovered his fascination with materials science and its potential for sustainable technological advancement.

Following his undergraduate degree, he embarked on an MPhil in Materials Engineering at the same university, focusing on materials sustainability and development and advanced composites. At the same time, his research interests flourished, particularly in the field and quest for sustainable materials, where he worked on conductive polymer composites, graphene-enhanced materials for supercapacitor electrodes and biodegradable fibres from plantain for sanitary products.

Alongside his academic pursuits, he has been actively involved in practical experience and leadership roles. As a graduate teaching assistant and research team leader, he has contributed to various research projects aimed at advancing sustainable technologies. He has also been involved in initiatives to promote innovation and sustainability within the materials engineering community. Notable among these is the opportunity and call to present his wonderful work on biodegradable fibres from plantain to be used as absorbent cores in sanitary pads at COP28, Prototype for Humanity, in Dubai. Looking ahead, he is eager to delve further into polymer technologies and renewable energy solutions, using his expertise and passion to drive positive change and make meaningful contributions to African society and the world at large. Email: joshlabi723@gmail.com LinkedIn: www.linkedin.com/in/joshua-alabi-4a1b7b1b0/



Emmanuella Brown Fasinu is a first generation female engineer with a multidisciplinary background in renewable and sustainable energy, energy efficiency, energy policy and planning, clean cooking and materials engineering. Her strong scholastic dedication right from Mfantsiman Senior High School gained her admission to the Kwame Nkrumah University of Science and Technology where she obtained a Bachelor's Degree in Materials Engineering.

Born and bred in Ghana, she has an unwavering passion for the sustainable development of Ghana and Africa as a whole. She focuses on green research and engineering approaches to solve societal problems, especially those affecting women and children through renewable and sustainable energy.

As a result of her passion to become a leading authority in advocating for a continent-wide shift to decentralised renewable energy for development, climate change mitigation and

energy independence, she is currently pursuing a Master's Degree in Renewable Energy Technologies at the Kwame Nkrumah University of Science and Technology under the EU-ECOWAS Scholarship Programme on Sustainable Energy. Her relentless diligence facilitated the opportunity to be selected for an ERASMUS exchange at Johannes Kepler University, Linz in Austria, where she is able to take advantage of exposure to cross-cultural infrastructures, technologies, mindsets and approaches to promote sustainable energy and climate action.
The type of work she most enjoys is conducting rigorous scientific research, analysing and visualising complex data sets, and translating findings into actionable policy recommendations. In the near future, she envisions a long life's work ensuring that all Africans have access to affordable, reliable and clean energy by 2050. Email: brownemmanuella9@gmail.com



Geoffrey Muchiemi Mitambo is a dynamic Kenyan youth with a passion to make a meaningful impact on the global stage, particularly in the areas of circular economy and renewable energy. He holds a Bachelor of Science degree in Mechanical Engineering from Dedan Kimathi University of Technology. He is currently pursuing a Masters in Machine Tool Design and Manufacturing at the same university. In his quest for knowledge, he competitively secured a place as an Erasmus exchange student at the Johannes Kepler University in Austria, where he is currently based at the Institute of Polymeric Materials and Testing (IPMT). His research topic on the recyclability of polymers has contributed greatly to this adventure.
Mitambo's passion for sustainability extends beyond the confines of academia and permeates every aspect of his professional and personal endeavours. His areas of interest range from circular economy principles to renewable energy technologies, reflecting a holistic approach to addressing pressing global challenges.
Through his unwavering commitment to innovation and collaboration, Mitambo is poised to drive meaningful change and inspire future generations to embrace sustainable practices. Africa has unrivalled renewable energy potential. This fact is Mitambo's driving force to progressively make a scientific impact in this field, especially in solar energy. Email: geoffreymitambo56@gmail.com



Emmanuella Buerki Nelson is a first-generation engineer from Ghana who sees challenges as opportunities for growth. Her passion for maths and science has always been strong, driving her curiosity for research, engineering and innovation. This enthusiasm led her to pursue a degree in Mechanical Engineering at the Kwame Nkrumah University of Science and Technology, specialising in Thermofluids and Energy Systems.
In her third year, she led a project on clean cooking, which deepened her understanding of sustainable energy. Recognising the environmental impact of traditional energy sources, she understood the need to advocate for clean and innovative solutions to protect the environment without compromising energy production, distribution and demand. This understanding influenced her professional life, where she worked as a researcher at the Sustainable Energy Service Centre and later at Sustainable Energy for All. She is currently pursuing a Masters in Mechanical Engineering with a focus on Thermofluids and Energy Systems. As part of this programme, she had the opportunity to participate in an ERASMUS programme at Johannes Kepler University.

To expand her network and give back to the community, she is actively involved in the African Network for Solar Energy (ANSOLE) and volunteers for two groups, TueMpower Africa and Your Choice in Engineering Matters. She attributes her success to the support of her family, friends and mentors such as Dr Richard Opoku, Dr Eunice Akyereko Adjei, Mr Mikael Melin and Dr Caroline Ochieng. Email: Ekuanelson8@gmail.com



Enock Kiprono Ngeny is a graduate student at the Dedan Kimathi University of Technology in Kenya. He is of Kenyan origin. He completed his BEng in Chemical and Process Engineering at Moi University. He has enrolled for an MSc in Mechanical Engineering at Dedan Kimathi University of Technology and expects to graduate in December 2024. He is participating in the Erasmus exchange programme at the Johannes Kepler University (JKU), Linz in the summer semester of 2024, where he is attached to the Institute of Polymeric Materials and Testing (IPMT).

Enock has previously worked as a technical trainer at Ol'lessos Technical Training Institute (2018-2020), Eldoret National Polytechnic (2023-date) and as a graduate assistant at Dedan Kimathi University of Technology (2021-2023). He is passionate about environmental conservation and while working at Ol'lessos Technical Training Institute, he initiated the formation of the Environmental Club, where he served as patron and led various awareness forums, including partnering with Kenya Forest Service in tree planting. Enock's research interests are in renewable energy and biomaterials. He is a registered Graduate Engineer with the Engineers Board of Kenya (Reg. No. B17238). Email: enockngeny@gmail.com



Prof. Egbe with exchange students from Ghana (left) and Kenya (right)

STUBE-Ost Weekend Seminar on the Sustainable Development Goals (SDGs), 22-24 March 2024, Halle (Saale), Germany

In the flyer of the **Annual Program 2024 (Jahresprogamm)**, one can read the following: „The STUBE study support programm for students from Africa, Asia, Latin America and Eastern Europe offers weekend seminars, academies and excursions that are addressing topics related to Sustainable Development and Global Learning. STUBE supplements individual subject-specific studies with high-quality extracurricular education and gives international students the opportunity to exchange personal experience and knowledge in the field »
For general information about STUBE in Germany, please visit https://stube-info.de/en/home



Participants at STUBE-Ost Weekend Seminar on SDGs

The weekend seminar on Sustainable Development Goals (SDGs) & Plans for 2025 brought together 18 participants from Burundi, Cameroon, Colombia, DRCongo, Egypt, Germany, Ghana, India, Kenya, Myanmar, Nigeria and Uganda. The seminar was facilitated by Ms Jana Ihlenfeldt, who is responsible for the pedagogical content of STUBE-Ost. The seminar started on Friday evening, 22 March, with an introduction of all participants in the form of a mutual interview and introduction of the interviewee. This was followed by a retrospective lecture entitled "Beginnings of STUBE-Ost" by Prof. Dr. Daniel A. M. Egbe, who was the main invited speaker during the seminar. Prof. Egbe was able to talk about the beginnings of STUBE-Ost because he was one of the first students to attend the STUBE-Ost seminars when all started in 1993 (for details, please read the article in German by F. Mikutta and N. Schleicher, in MIGRANTh issue 2, 2023, page 47, online: ISSN 2942-3236, print: ISSN 2942-3244).



Introduction of participants through mutual interview and introduction of the interviewee

In the early years of STUBE-Ost, the seminars were held exclusively in German. In the last two decades, English has become the language of communication during STUBE events, especially after the signing of the Bologna Agreement.



Petra Molnar, the first facilitator of STUBE-Ost, leading in 2000 a seminar on ***Plans for 2001***

On the basis of the certificates of participation obtained, he was able to trace, present and discuss interactively with the participants some of the seminar topics from 1997 to 2004, as listed below:

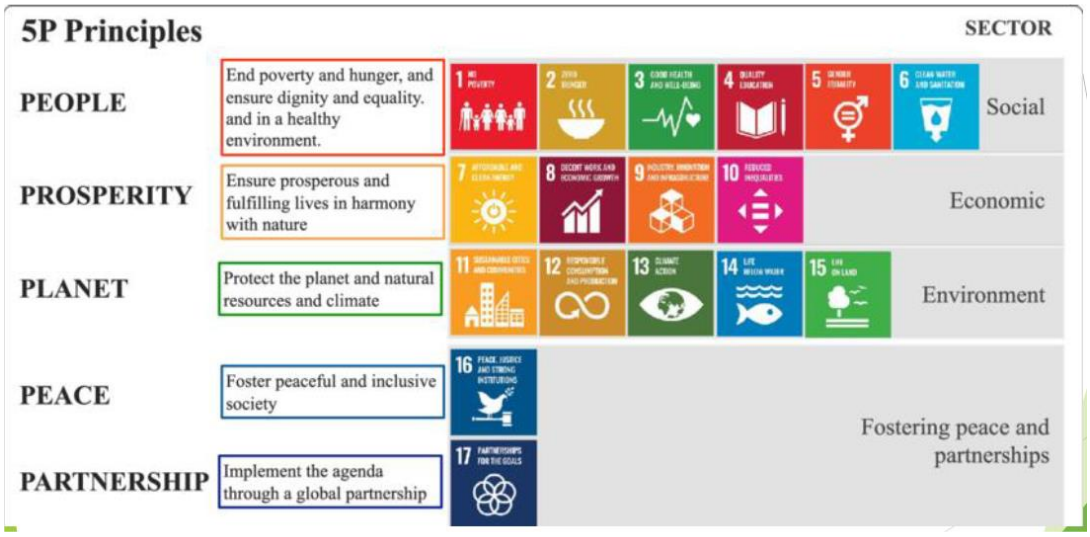
- „*STUBE-Plans for 1998*“, 27-29.06.1997, Weimar
- „*Population growth-global challenge of the 21st century*”, 05-07.11.1999, Pesecken-dorf
- “*A millennium free from hunger-Food for all-Challenge for all*”,09-11.02.2001, Gernrode
- “*What does foreign mean here? Intercultural training - the key to understanding*” 24-26.05.2002, Jugendbildungshaus Ottersleben
- “*Commodity academics/true academics - education as a commodity*” (*translated from German “Wa(h)re Akademiker-Bildung als Ware”*), 25-27.10.2002, Martin-Luther Universität Halle

- "*The fight, dignity and death - the global challenge of AIDS*", 29.11-01.12.2002, Jugendbildungsstätte "Weißer Hirsch" Dresden
- ""*The newcomers are coming"-EU enlargement and development policy*", 23-25.04.2004, Kloster Drübeck, Ilsenburg (Harz)
- "*Stolen childhood-children at war and on the run*", 11-21.04.2004, Weimar



Professor Daniel A. M. Egbe lecturing at the Seminar!

The main focus of the second day, Saturday 23 March 2024, was on the SDGs. Prof Egbe started with a brief presentation of an excerpt from the Jena Declaration 2019 "The concept of race is the result of racism and not its prerequisite", then gave his own definition of a "Global Citizen" and hailed the Manden Charter, proclaimed in Kurukan Fuga, Mali, at the beginning of the 13th century and inscribed in UNESCO's Representative List of the Intangible Cultural Heritage of Humanity in 2009, as a prelude to the SDGs. This was followed by an overview of the 17 SDGs by Jana Ihlenfeldt, and then a detailed presentation of SDG7 by Prof. Egbe.
The participating students were divided into 4 groups to exchange on the 5 pillars/principles of the SDGs. 3 groups each had their focus on the pillars of **People**, **Prosperity** and **Planet**, while the 4th group focused on the pillars of **Peace** and **Partnership**.



After almost 2 hours of working in groups, the main findings of each group were presented.



*Group working on **peace** and **partnership** presenting the main outcome of their discussion*

The afternoon of the 23rd was dedicated to an excursion in the city of Halle. Various SDG initiatives of the city and historical sites were visited.



Excursion in the city of Halle: At the monument of Georg Friedrich Händel

The Saturday evening was time for fun, games and dancing.
The last day of the seminar started with presentations from 5 students who volunteered to present the current state of the SDGs in their respective countries (Nigeria, Burundi, DRCongo, India and Kenya). The focus on the SDGs differs from country to country. For example, for DRCongo, the achievement of SDG 16 (peace) currently takes precedence over all other SDGs. There was a general consensus that it will not be possible for most countries of the Global South, especially African countries, to achieve most of the SDGs by 2030. There was a strong desire to extend the agenda for another 30 to 40 years.

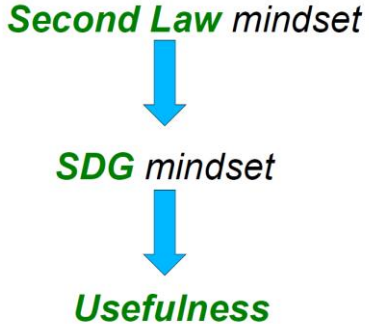


Time for fun and games on Saturday evening



Student presentation on the current state of the SDGs in Nigeria

Prof. Egbe concluded the seminar with a talk on the "Principle of Passing it On", which he related to the **Second Law of Thermodynamics** and **Genesis 12 verse 2**. He urged Africans to trust themselves, be willing to make **Mistakes** and learn from their **Mistakes** in order to develop the African continent.



He told the participants that he hoped to see some of them at the weekend seminar on "Green Future: Global Energy Transition", to be held in Jena from 15 to 17 November 2024 and co-organised by ANSOLE e.V..

Biographies of some Participants of the STUBE Seminar



Jana Ihlenfeldt studied Ethnology and Educational Science at the University of Heidelberg and the University of Leipzig. During her studies she studied Bahasa Indonesia at the Universitas Negeri Solo and the Universitas Negeri Yogyakarta for two years as part of the Darmasiswa scholarship.
She has been working for Diakonie Mitteldeutschland in Halle since 2012. In the first years she supported volunteers during their voluntary year in Germany and abroad (e.g. Estonia, Argentina, Israel). Since 2020 Jana Ihlenfeldt is responsible for the implementation and realisation of the seminar programme of the study support programme STUBE in Thuringia and Saxony-Anhalt. Email: ihlenfeldt@diakonie-ekm.de



My name is **Nibigira Bampige Eric**. I was born in one of the East African countries called Burundi. From a young age, I had a passion for small business, which made me think about a career in business studies.
After completing high school in Kenya, I returned to Burundi to study at university. I graduated with a degree in Business Administration and Economics, specialising in Marketing. I got my first job as a secondary school teacher. It was there that I developed various skills such as communication, organisation, collaboration and so on.
A year later, I worked as an accountant for a local association of six health centres. After almost 5 years, I went to work as a project accountant in one of the non-governmental organisations in Burundi. The four-year project was on environmental adaptation for food security. At the same time, I volunteered as a radio presenter and producer in one of the local radio stations, presenting in both Kirundi and Kiswahili. Towards the end of the project, I was able to complete my Masters in Business Administration, which I had started a few years earlier.
After the NGO project, I worked as a business trainer in another local organisation in a project that helped women running small businesses across borders in the Great Lakes region (Burundi, Rwanda and DR Congo). This is the work I have been doing until September 2023, when I moved to Germany to pursue a Master in Development Studies with a focus on sustainability. Email: bampigeric@gmail.com



My name is **Nabukenya Barbara** and I am from Uganda. I hold a Bachelor's Degree in Business Administration (BBA) from St. Lawrence University in Uganda and am a former Finance Officer at AMBSO. I moved to Germany six months ago to pursue a Masters in Development Studies at the Adventist University in Friedensau, Germany. Email: nabukenyabarbara2@gmail.com



Born in Ghana in 1996, **Maxwell Osei Mensah** embodies a fervent commitment to academic excellence and social progress. His educational journey began at the Osei Tutu Senior High School in Ghana, where his passion for education and development took root. While pursuing a Bachelor's degree at the Kwame Nkrumah University of Science and Technology, Maxwell thrived academically and actively participated in research and extracurricular activities. Driven by a deep curiosity and a desire to make a difference, Maxwell is currently pursuing a Master's Degree in Development Studies at Friedensau Adventist University in Germany, where he is immersing himself in the intricate dynamics of global development, focusing on socio-economic inequalities and sustainable solutions. Maxwell's academic odyssey is characterised by intellectual rigour, creativity and empathy. He envisions a future in which his education and expertise serve as catalysts for positive change, addressing pressing challenges faced by communities around the world. Through his unwavering commitment to scholarly inquiry and lifelong learning, Maxwell strives to make a tangible impact in the field of development studies and contribute to a more just and prosperous world. Contact : maxwelloseimensah9@gmail.com



Clever Akili Uwezo, is a citizen of DR Congo. He was born on 31 October 1998. He obtained a Bachelor of Arts in Social Sciences at the Kampala International University in Uganda in 2019. He returned to DR Congo and worked from 2020 to 2022 as a public relations manager at CODEVAH (Committee for Development and Humanitarian Aid). His main task was to manage the organisation's relations with the media and the community. He led a team of PR professionals to cultivate the organisation's positive reputation by writing press releases, building relationships with journalists, organising interviews and press conferences, and planning strategic communications. Since September 2023, he is a Masters student in Development Studies at the Adventist University of Friedensau. He speaks French, English, Lingala and Kiswahili (mother tongue). He is learning German. Email: akiliuwezoclever@gmail.com

IMPRESSUM

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