Africa Centre of Excellence in Future Energies & Electrochemical Systems

ACE-FUELS NEWSLETTER

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The Africa Centre of Excellence in Future Energies & Electrochemical Systems (ACE-FUELS) at the Federal University of Technology Owerri, Nigeria, is established to fill a growing education, skills and information gap in the field of renewable and other clean energy sources within the sub region and in this way address the regional development challenge of poor availability and access to energy.

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From The Centre Leader

Electrochemical Science and Technology berths in Sub Saharan Africa!

Greetings and welcome to the year 2020. As the Centre Leader of the Africa Centre of Excellence in Future Energies and Electrochemical Systems at the Federal University of Technology Owerri, Nigeria, it gives me great pleasure to introduce this inaugural issue of ACE-FUELS Newsletter, a new quarterly publication of ACE-FUELS. ACE-FUELS Newsletter is a multi-purpose Instrument that will provide key information about happenings at the Centre, in order to keeps actual and potential partners up to date of our multidimensional educational, research and development activities.

Electrochemistry is gaining a lot of interest and importance nowadays because of the central role it is expected to play in a future sustainable society. Indeed, modern technologies have come to depend heavily on advances in the field of electrochemical science and technology. Technologically, electrochemistry touches our lives positively in diverse ways that only few people fully appreciate, with widespread applications in corrosion and materials protection, paints and coatings, environmental remediation, water purification, sensors, batteries and energy storage systems, fuel cells, photovoltaics, supercapacitors, catalysis, industrial-scale synthesis, etc. Asides the well-known fields of application, new and emerging areas are increasingly becoming important. There is indeed no doubt that electrochemical science and technology has capacity to institute and nurture multidisciplinary research initiatives. Unfortunately, the area has yet to receive the deserved attention and interest amongst researchers in Nigeria and indeed Sub-Saharan Africa. Consequently, the immense accruable benefits remain untapped and unexplored.

Consistent with the strategic objective of the Federal University of Technology Owerri (FUTO), to 'Provide and promote sound basic scientific training as a foundation for the development of technology and applied sciences', the Electrochemistry and Materials Science Research Unit, Federal University of Technology Owerri, in partnership with Bio-Logic Science Instruments, organized an Exposition and Open House Discussion on Electrochemistry, with theme 'New Trends in Electrochemistry and the Role of Electrochemical Technologies in Africa's Economic Development'.

A crucial fall out of the workshop was the creation of the Electrochemical Energy, Interfaces and Nanotechnology (EMINeNT) Research Consortium, with mandate to develop multi-disciplinary research projects based on electrochemical technologies and to draft a comprehensive research proposal involving the different research areas to set up a turn-key electrochemical technologies laboratory. This aspiration has been given physical form with the establishment of the Africa Centre of Excellence in Future Energies and Electrochemical Systems (ACE-FUELS) at FUTO, following selection of the consortium's proposal for funding, within the framework of the World Bank Africa Centre of Excellence (ACE) Impact Projects.

EMRU-FUTO/Bio-Logic Workshop (March 14, 2018)

ACE-FUELS at FUTO has been established to develop a critical mass of well-trained researchers to meet requirement of R&D professionals for clean energy and related high technology applications, as well as promote local content in research and innovations by initiating necessary value-driven industry-academia collaborations, in line with global best practices. The ACE-FUELS vision plugs perfectly into the mission of the University, and the strategic blueprint of the 7th substantive Vice-Chancellor, Prof. Francis C. Eze, as encapsulated in the mantra, 'Driving the Culture of Excellence'. We are committed to achieving the Centre's core education mandate by strengthening relevant existing postgraduate programmes in our partner Departments, as well as through novel, bespoke multidisciplinary PhD and MSc and professional short courses related to the focus areas of the Centre (Future Energies, Electrochemical Technology, Nanotechnology, Corrosion Technology). We have put in place, a robust portfolio of national, regional and international partnerships as well as cross-cutting interdisciplinary linkages, to promote high-impact research and development, knowledge sharing and dissemination, technical skills and capacity development, among others. This is in addition to a gender-friendly culture that gives priority to female students. We realize the importance of academia/industry collaboration for education, training and skills development, for innovation and technology transfer through generation, acquisition, and adoption of knowledge, as well as for promoting entrepreneurship. We are therefore leading the push to make FUTO a truly Entrepreneurial University by creating the long-awaited bridge between science and technology, which will facilitate translation of innovative and ground-breaking research findings to industry and the larger society.

Indeed, the year 2019 truly marked the dawn of a new era for Electrochemistry in Africa, with the establishment of ACE-FUELS in addition to the hosting of the 70th Annual meeting of the International Society of Electrochemistry (ISE) in Durban, South Africa in August, the first of its kind in Africa.

We at ACE-FUELS believe the future starts now. Hence, for us, the journey has already begun, and we are set to deliver the ACE mandate to the letter. Ours is a community of shared vision and innovation that fosters the hope of a secure today and a better future. We have the zeal. We have the faculty. We have the partners. We have the enabling environment. Wouldn't you rather join us as we launch into a future with endless opportunities?

Yours sincerely,
Emeka Oguzie

FUTO Vice-Chancellor inaugurates ACE-FUELS Management Team

History was made on Tuesday 5th March 2019 at the Federal University of Technology Owerri, Nigeria, as the Vice-Chancellor, Prof. Francis Chukwuemeka Eze inaugurated the Management Team of the newly established Africa Centre of Excellence in Future Energies and Electrochemical Systems (ACE-FUELS). The Vice-Chancellor in his inaugural speech re-emphasized the objectives of ACE-FUELS, which he noted aligned perfectly with the mission of the Federal University of Technology, Owerri - to operate practical and result-oriented programmes and training geared towards transforming the nation's economy with a sound technological base. The visibly elated Vice-Chancellor said with the current output by what he referred to as the 'Young Team', ACE-FUELS has demonstrated good grasp of the importance of academia-industry collaboration for education, training and skills development for innovation and technology transfer through generation, acquisition, and adoption of knowledge, as well as for promoting entrepreneurial start-ups and spin-offs.

FUTO VC, Prof. F.C. Eze (Sitting Middle) with Principal Officers of the University and the ACE-FUELS Management Team

Prof. Eze pointed out that the set goals and objectives of the Center as required by the World Bank can only be achieved through absolute commitment and hard work, adding that project goals being met will be major criteria for subsequent project renewal. He thus emphasized the need for all members to work together with remarkable zeal to achieve success for the team and the University as a whole. Speaking further, the Vice-Chancellor urged the ACE-FUELS Management to stick to stipulated deadlines and work towards on-time graduation of students, in line with the key objectives of the project. He encouraged the Team members to be good team-players and team-builders by sharing information and harmoniously resolving challenges. He urged the Centre to encourage students to spend more time on research to help them build up their chosen careers. 'As we began well, we will end well', he enthused. The Vice Chancellor assured the ACE-

FUELS's Management Team of the University Management's unalloyed support especially during this stage of producing the implementation plan of the Centre as funds were still being expected from World Bank. He disclosed, to the delight of the Team, that Management has donated a brand-new building to the ACE-FUELS Centre and that expedited action was being taken by the building contractor to ensure that office spaces are made available. The Vice-Chancellor, on behalf of the Senate and Management of the University capped his speech with the official inauguration of ACE-FUELS Management Team. The team has Prof. Emeka Oguzie as Centre Leader, with Prof. Chinyere Ada Madu as Deputy Center Leader.
Present during the inauguration were top FUTO Management staff including the Deputy Vice-Chancellor (Academic), Prof. N.J. Okeudo; Deputy Vice-Chancellor (Administration), Prof. J.S. Orebiyi; the Registrar, J.U. Nnabuihe; and the University Bursar, Mrs. Helen Onuoha. In a vote of thanks, the Deputy Centre Leader, Prof. Chinyere Ada Madu commended the University Management for sustenance of the Centre so far and assured the Vice-Chancellor of the Centre's readiness to achieve the set goals and objectives in addition to delivering the Management Team's mandate, making the university to stand out as a world-class Centre of Excellence.nIt will be recalled that out of 122 proposals submitted for the establishment of new ACE Impact Centers under ACE-3. FUTO emerged as one of the 16 Nigerian Universities selected as Centers of Excellence by the World Bank Group, having met the ACE impact requirements.

ACE-FUELS joins ACE Impact Project Launch and Boot Camp in Djibouti

Members of the ACE-FUELS FUTO management team joined their counterparts from other Africa Centers of Excellence at the ACE Impact Project launch and boot camp held from February 18-26, 2019 in Djibouti. The launch and boot camp were part of activities organized to formally set up the newly established ACE Impact Centers across Africa. On the ACE-FUELS FUTO delegation were the Deputy Vice-Chancellor, Research, Development & Innovation, Prof. B.C. Anusionwu; ACE-FUELS Centre Leader, Prof. Emeka Oguzie. Others are M&E Officer, Prof. Nnamdi Ogueke. Others were the project accountant, Ifeoma Mgbenu; internal auditor, Lucky Onuoha and procurement officer, Ugochi Ozurumba.

FUTO Delegation: L-R: Ifeoma Mgbenu, Prof. Anusionwu, Ugochi Ozurumba, Prof. Ogueke, Lucky Onuoha, Prof. Oguzie

FUTO VC Leads ACE-FUELS to the 2nd ACE Impact Workshop in Dakar

FUTO Vice Chancellor, Prof. Francis Eze led the ACE-FUELS delegation to the 2nd ACE Impact Workshop in Dakar (24 – 27 September 2019). The workshop hosted a special programme for Vice Chancellors, highlighting the importance of university leadership to the overall sustainability of ACE Impact Centres, as well as to achieve institutional impact. ACE-FUELS collaborated with other ACEs to set up the ACE Network on Energy Power and Environment, which is to facilitate dialogue and collaborations amongst the Centres.

FUTO Delegation led by the VC, Prof. F.C, Eze (3rd from left)

World Bank ACE Impact Project gathers momentum, trains Communication Officers

As part of its capacity building efforts towards the effective take-off of Africa Centers of Excellence (ACE) Impact Project of the World Bank, the Association of African Universities (AAU) organised a 3-day training workshop on Communication Skills and Strategies for Communication Officers of the selected Centers of Excellence across Africa. The workshop which held from 24th to 26th of April, 2019 at the AAU Headquarters in Accra, Ghana, was aimed at equipping the Communication Officers with necessary knowledge, skills and strategies to function effectively at their various Africa Centers of Excellence. The workshop also highlighted best practices in internal and external communication strategies that raise motivation and productivity in institutions

Dr. Nwogu receiving a certificate of participation from the Secretary-General of AAU, Prof Etienne Ehile

Participants were taught the best strategies to adopt in communicating to their teams, their university management, and external bodies, and particularly stakeholders, using best practices, the objectives of their centres, appraisal of levels of

achievements, constraints, and avenues for improvement. According to the facilitators, the Communication Officer is at the center of information dissemination and brainstorming, and his/her activities link the various sections of the Centre with the sole aim of communicating the best of information and news. Facilitators at the workshop included experts drawn from the fields of Communications, Journalism, Media Relations, and Graphic Design, among other related fields. The workshop had in attendance over 60 participants comprising Communication Officers from Africa Centres of Excellence across Africa, Public Relations Officers from higher institutions as well as representatives of National Universities Commission (NUC) – Nigeria's university regulatory body.
ACE-FUELS was represented at the workshop by the Communication Officer, Dr. Ngozi Claribelle Nwogu.

PROJECT NEWS

Stimulus to Trigger Innovation: ACE-FUELS Explores Collaborations with Researchers in the UK

The ACE-FUELS Centre Leader, Prof. Emeka Oguzie undertook a research visit this June 2019, to the University of Bath, UK, hosted by Prof. Frank Marken (Member, ACE-FUELS International Science Advisory Board), with support from an internal Global Challenges Research Fund (GCRF) from University of Bath. Prof. Oguzie was accompanied on the trip by Dr. Chris Akalezi (ACE-FUELS PhD Advisor). The trip was to strengthen research collaborations between FUTO and University of Bath for a project on indirect fuel cells for harvesting electricity from industrial waste. Prof. Marken exploited his influence within the UK research community to secure appointments with researchers in some other UK Universities, thus paving the way for the Centre Leader to make presentations on the ACE-FUELS vision to the research communities in those universities.
In all, Prof. Oguzie shared the ACE-FUELS vision with researchers in

- Cardiff University (June 3)
- University of Cambridge (June 10)
- University of Bristol (June 13)
- Oxford University (June 17)
- Imperial College London (June 20)

By and large, the Centre Leader's UK visit was successful and insightful, as all the institutions visited were very impressed and fully identified with the ACE-FUELS vision and excited about the prospect of collaborating with the Centre in such areas as research co-supervision, joint grants applications, joint workshops. Going forward, the Centre shall strive to develop the structures for collaboration with identified research partners and to build upon the contacts already established. Indeed, these partnerships provide a much-needed stimulus to trigger high end research and innovation activities within the Centre.

International Tripartite Partnership to Promote Electrochemical Science and Technology in Sub Saharan Africa

ACE-FUELS has entered into a strategic tripartite partnership with the CREST Group at University of Cambridge and the Marken Group at University of Bath. This partnership is a positive outcome of the recent visit of the ACE-FUELS Centre Leader, Prof. Oguzie, to some UK universities, including Bath and Cambridge.

L-R: Prof. Oguzie, Prof. Frank Marken, Prof. Adrian Fisher, Dr. Akalezi @ Department of Chemical Engineering & Biotechnology, University of Cambridge

The CREST group led by Prof. Adrian Fisher is multilocational, based in Cambridge, at the Campus for Research Excellence and Technological Enterprise (CREATE) in Singapore as part of the Cambridge CARES activity and at the Cambridge University Virtual laboratory, located in the International Centre for Soft Matter, Beijing. The group's research activities are focused on sustainable reaction engineering, bioengineering and clean energy production and numerical simulation of chemical and electrolysis reactions. The Marken group, based at the University of Bath, is led by Prof. Frank Marken and has research focus on water, solar energy, and sensing, including development of novel electrochemical technologies. The group organizes the Bath Electrochemistry Winter School and the Bath Electrochemical Impedance Summer School held annually at the University of Bath campus.
This tripartite partnership is intended to provide a ready framework to promote adoption of Electrochemical Science and Technology in Sub Saharan Africa, through an initiative tagged "Electrochemical Technologies for Africa's Sustainable Economic Development" (ETASED). The ETASED programme shall comprise a series of workshops and hands-on training sessions on electrochemical techniques and applications, targeting researchers, industry personnel and graduate students within the sub region. There is no doubt that Electrochemical Science and Technology has capacity to institute and nurture multidisciplinary research initiatives. Unfortunately, the area has yet to receive the deserved attention and interest amongst researchers in Nigeria and indeed Sub-Saharan Africa. Consequently, the immense accruable benefits remain untapped and unexplored. ETASED shall build upon and expand the ACE-FUELS "Future of Electrochemistry in Modern Africa" workshop series, as well as facilitate actualization of the Pan African Electrochemistry Network, conceived initially in 2016 by scientists from Nigeria, Ghana, South Africa, Ethiopia, Egypt and the UK, with the aim of popularizing the applications and benefits of electrochemical science in Africa.
The success of the ETASED initiative is guaranteed by the commitment of the ACE-FUELS leadership to the programme. Moreover, Prof. Fisher and Prof. Marken shall deploy the

experiences they have gained in organizing the ''Cambridge Master Class - Advanced Electrochemical Techniques" programme, held annually at the CREATE Campus, Singapore as well as the Bath Electrochemistry Winter School and the Bath Electrochemical Impedance Summer School, to ensure that ETASED achieves the intended goals.

Engagement with FUTO Alumni members of ACE-FUELS Sectoral Advisory Board (SAB)

In realization of our vision to engage and integrate FUTO Alumni as key stakeholders in the Centre, the Centre Leader (CL), Prof. Oguzie, held a crucial meeting with distinguished FUTO Alumni who are members of the ACE-FUELS Sectoral Advisory Board (SAB) at Sheraton Hotel Lagos. Present at the meeting were:

- Sir Ndukwe Osogho-Ajala, OON (Managing Director/CEO, Soul Mate Industries Ltd. Lagos)
- Dr Andrew Ejayeriese (General Manager Exploration, Exxon Mobil Nigeria)
- Prof Ndubuisi Ekekwe (Chairman, Fasmicro Group, Pittsburgh, USA)
- Engr. Victor Ugorji (Chevron Nigeria Ltd.)
- Prof Theodore Ifeanyi Onyeche via Telephone (International Operations, Cutec-Forschungszentrum, Germany)

The CL briefed them gathering on the vision and mission of the ACE-FUELS Centre, informing them of the key role of the Sectoral Advisory Board members as major drivers of the envisaged development impact of the ACE Impact project, which is expected to directly benefit the larger society. He subsequently identified the sectors within the Centre's core areas: Energy and power, chemical and petrochemical, utilities, corrosion protection (pipelines, coatings, marine, offshore, utilities etc.), mining and natural resources, electronic and hi-tech, etc. The CL urged the Alumni SAB members to serve as links between the Centre and the private sector and assist the Centre in such areas as staff and student internship placements, funding and materials support, scholarships, endowments.

L-R: Prof. Oguzie, Engr. Ugorji, Prof. Ekekwe, Dr. Ejayeriese, Sir. Ndukwe

Responding, the Alumni SAB members congratulated the University on the successful attraction of World Bank funding to establish ACE-FUELS, noting that such opportunity, if properly managed, will significantly change our great University. They observed from the presentation that there are very clearly enumerated processes on how things will be done and milestones that need to be met and advised that the Centre Management must imbibe a culture of transparency, integrity, strict merit application, inclusion and diversity. They all affirmed their unwavering commitment, support and readiness to make the ACE-FUELS initiative work.

IN THE SPOTLIGHT: Professor Egwu Eric Kalu

Prof. Egwu Eric Kalu is a Research Collaborator with the Africa Centre of Excellence in Future Energies and Electrochemical Systems (ACE-FUELS), Federal University of Technology, Owerri, Nigeria. After hitting the rare feat of bagging a First-Class Degree in Chemical Engineering from the University of Lagos, Nigeria, young Egwu went abroad for further studies. With a specialty in Electrochemistry spanning a study and research period of over three decades, an abiding research interest in energy generation, conversion and storage; and three patents to his scholarly badge, Prof. Egwu's selection for collaboration with ACE-FUELS, FUTO is hardly surprising. What is, perhaps, intriguing is how his childhood experiences and philosophy garnered through tree climbing conspired and spurred him into a path that has not only seen him realise his dreams, but also made him a sought-after Electrochemical Engineer who has so much more to bequeath the next generation. In this interview with ACE-FUELS News crew, Prof. Egwu bares it all, from his humble beginnings to his scholarly endeavours; and from all you must know about Electrochemical Science and Engineering, to what he brings to the ACE-FUELS FUTO table. Excerpts.

Who is Prof. Egwu Eric Kalu?

My place of birth where I also attended elementary school was Amaokwe Item in Bende LGA of Abia State, Nigeria. I left the village to attend Methodist College Uzuakoli (the oldest secondary school in Igbo land) in 1973. After completion of my secondary education, I studied Chemical Engineering in three different countries. I obtained a Bachelors Degree from University of Lagos in Nigeria, Master of Applied Science (MASc) from University of British Columbia, Vancouver in Canada and a Ph.D. from Texas A&M University, College Station Texas in USA. I cherish and appreciate the differences and similarities in the methods and approaches the three countries employ in training their students.

How did growing up influence your life, career, and philosophy?

Growing up in the village equipped me with self-belief. There was the sense imbibed in us that one can only limit oneself. This was not taught in school but at the playground or when competing for the best climber of tall trees. The tree is there for you to climb. You can climb and reach the top or stop half way if you are scared. From then on, my view of life has

always been that an individual can only limit himself. You can stay at the bottom or tree top or in the middle; it all depends on your climbing ability and determination. Philosophically, whatever we do, may it be motivated towards making a difference that will improve the human condition.

Talking about motivation, what would you say motivated you to study Chemical Engineering?

My motivation to study chemical engineering came from career advice on the discipline as "the only engineering discipline that caters not only for what you eat, wear and relax with, but also plays a role in your choice of means of transportation from one point to another".

What is the best thing about being a Chemical Engineer, and how well have you enjoyed your chosen career?

The broad nature of areas covered by the discipline makes the chemical engineer always relevant to contemporary issues. I have enjoyed the career especially as a teacher of young minds.

You made a First Class in Chemical Engineering in University of Lagos. What was the secret?

The secret was that village idea of self-belief and tree climbing. You can choose where to end, either at the bottom, middle or top of the tree. It all depends on how hard you work and how much you want to reach your own goal. Call it self-motivation.

Why did you choose to specialize in Electrochemical Engineering?

I am glad you asked that question. I made the choice while I was still in Nigeria because I was interested in the electrochemical conversion of carbon dioxide into useful chemicals. At the time, I reasoned that free carbon dioxide from industrial plants and conversion to valuable chemicals is an appealing economic venture. The environmental impact of carbon dioxide was not yet a major issue then.

What are your thoughts on the development of Electrochemical Science in Nigeria and possible benefits of growing the area?

Nigeria is overdue for the growth of Electrochemical Science and Engineering. We are consuming products of Electrochemistry in very large quantities. Think about the batteries in our cell phones, rechargeable lanterns, watches and other wearables, aluminum products, corrosion etc. We need to train experts that can help us manufacture these energy storage devices in Nigeria.

FUTO competed and won World Bank funding for establishment of the Africa Centre of Excellence in Future Energies and Electrochemical Systems (ACE-FUELS). How did you receive the news?

'We are consuming products of Electrochemistry in very large quantities. Think about the batteries in our cell phones, rechargeable lanterns, watches and other wearables, aluminium products…We need to train experts that can help us manufacture these energy storage devices in Nigeria.'

I was most excited about the news and I sincerely wish to acknowledge the team led by Professor Emeka Oguzie and the support the Vice-Chancellor, Professor F. C. Eze rendered to make it happen. It is a job well done that deserves all accolades. For many years, I have been wondering ways, how and when Electrochemical Science and Engineering can start to be appreciated as an important modern technological field. The Center will play a key role in doing that and I am happy it is located here in the South East Region of Nigeria.

How would your background and experiences strengthen ACE-FUELS academic and research position within the West African region?

I am a trained Electrochemical Engineer. My two higher degrees involved electrochemical research, including batteries, fuel cells, electrosynthesis and environmental electrochemistry. I have been working in the area since 1985 and I think my years of experience will be relevant in strengthening ACE-FUELS academic and research endeavours.

In what ways would ACE-FUELS tap into your specific research interests and networks?

'Renewable energy will be one in the mix of energy sources that we will need to protect our environment and at the same maintain a high-quality living standard for all.'

My research interests fit in with many objectives of the Centre in the area of Li-ion battery technology, supercapacitors and solar cells. My many years in the field mean a lot of contacts that one could reach out to on behalf of the Centre.

What are your views on the emerging energy trend, and why should we care about future energy?

The emerging trend involving search for alternative energy sources is a positive development that could eventually lead to practices that may improve the quality of our environment. We should all care because there is no other place we have like our earth which is the only abode for us that we know as human species.

Given the current global emphasis on renewable energy, do you think renewable energy is the solution to global energy crisis?

There is no one solution to the issue of energy. I would say that renewable energy will be one in the mix of energy sources that we will need to protect our environment and at the same maintain a high quality living standard for all.

Your research interests span generation, conversion and storage of renewable energy. Which major breakthroughs would you like to share with us?

Our recent contribution in energy storage has been in the development of low-cost approach to the fabrication of binder-free electrodes for Li-ion batteries as well as ultracapacitors or supercapacitors. The technology is something that a developing country such as Nigeria can easily adapt and use since it does not involve sophisticated equipment. I personally think that it should be the approach that we can take to advance and build a technological base. You have to crawl before you walk. The idea of trying to start running without even learning how to crawl or walk is not tenable in the long run.

What scientific properties distinguish materials that are suitable for the design of energy storage devices?

Electrochemistry is all about electron and charged ion movement, that is oxidation and reduction processes. This guides the properties of materials suitable for the design of energy storage devices especially the electrodes. Ability to give or accept electrons and/or ions or allow their movement or transportation are key characteristics required of electrochemical energy storage materials.

Can these properties be adapted to materials by say, combining materials that don't have these properties with ones that have them to generate hybrids?

The answer is yes. Hybrid or composite materials can be used for electrochemical energy storage. It is an area of intense investigation by material scientists, engineers of all categories and chemists.

What are the new key areas of research in the development of materials for energy storing devices?

It is a large field involving many electrochemical energy storage devices including batteries, fuel cells and ultracapacitors. And in each category, several types of systems are being developed or investigated. As such, a variety of materials are being looked into. More recent is the use of graphene oxide in lithium-ion battery (LIB) anodes, fuel cells as well as ultracapacitors. In the area of solid state batteries, a lot of polymers are being investigated.

'We have a great opportunity to be the African light shining to the wider world.'

Some argue that Nigerian academics tend to struggle at home and excel abroad. How true is this statement? Would you say that is your story too?

I do not totally agree with the characterization that Nigerian academics tend to struggle at home. The issue between being here and abroad can be likened to sending two people to weed a portion of a farmland. One individual is given the tools for weeding, like sharp hoes, while the other is asked to use bare hands and pull the weeds. Who do you think will do a better job? It is true that government is making effort to fund research but how do you conduct, for instance, electrochemical corrosion test that you need to run non-stop for six months without constant reliable electricity? The person in Nigeria doing this will appear to be struggling, while the one abroad will never experience a sudden loss of electricity within those six months.

Tell us more about what it is like studying, teaching and researching abroad?

It has been a worthwhile experience; especially since in the assignment of duties, a balance is always struck between teaching and research. If you are not actively involved in research, you are assigned more courses to teach and vice versa for research active faculty. The teaching load seems to be uniform here in Nigeria, which suggests to me that the departments and schools need a re-think on how to encourage and motivate faculty members to be actively involved in the research enterprise.

How would you describe your teaching and research style?

My teaching style is to be well prepared for class, state the learning objectives and students' expectations. I use variety and relevant examples for illustration and use stimulating and challenging questions to encourage student involvement and engagement. My teaching philosophy is that learning is a two-way process involving input and feedback. I use fundamental principles of sciences, mathematics and engineering to implement basic engineering research.

Describe a situation in which, as a researcher, you did "all the right things" and were still unsuccessful. What did you learn from the experience?

Being unsuccessful in a research endeavour is but a learning experience that the approach in which one "did all the right things" is after all not the right way. We always use our failure as a learning tool rather than as a failure. It is again like the toddler learning to walk, the first time he/she gets up, he/she wants to run and crashes on the ground. Next time, she/he takes a more cautious step-by-step walk and discovers that he/she can move from one point to another without falling. Experience has been acquired through failure. That's part of the research enterprise.

What should students and faculty expect from you as a research collaborator with ACE-FUELS, FUTO?

They should expect me to have the same commitment I have for the students and colleagues I have worked with in the past. I will give my best so that they can become the best they want for themselves.

What do you perceive of our research programme at ACE-FUELS developing over the next few years?

I expect the Center to become an important electrochemical research center in Africa that will not only be recognized within Africa but in the world. We have a great opportunity to be the African light shining to the wider world. The outlook is excellent as long as both the Centre leadership and members work closely and understandably.

Research and Development remains the core of the academic enterprise. Given your global exposure, where do you think Nigerian researchers need to get it right?

The lack of basic resources such as constant power, water supply and even chemicals put the Nigerian researcher in a disadvantaged state. What I think the universities can work towards is the provision of constant power and water at every institution. And for the researchers, as much as we want to compete globally, let us try to solve some of local needs with eyes on their global implications. For instance, we have abundant sunlight, should we not be leading on solar technology? Let us create our own crude technology as a start and with government protection of the market from imports of similar technology, we can continue the improvement needed to compete worldwide.

You have three patents to your credit. How does it feel owning a patent, and what is the extent of utilization of those patents in Nigeria?

It feels good to have an intellectual property contribution. Our patents originated from works we did in Canada and United States, but can be acquired and utilized in Nigeria by any business interested and working in the patented areas.

Drawing from your international experience, how can the quality of research output from Africa be improved?

The universities should de-emphasize quantity but rather put emphasis of quality of research output. There are measures out there for measuring the quality of papers published. That should be used to encourage and reward quality research.

'Let us create our own crude technology as a start and with government protection of the market from imports of similar technology, we can continue the improvement needed to compete worldwide.'

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