

CAS-TWAS Fellowships Boost S&T Capacity in the Developing World

With the objectives of supporting S&T development of developing nations, promoting cooperation and exchanges among their S&T workers, improving their capacity in S&T innovation and training their S&T talent, the CAS-TWAS Fellowships Program was launched in 2004. So far, CAS institutes have hosted some 280 scientists from developing countries, including 96 PhD students, 71 postdocs and 115 visiting scholars. These scientists have come from more than 30 developing countries, including Bangladesh, Egypt, India, Nigeria, Pakistan and Sudan. After returning home, they have become an important scientific force in and for their countries. The followings are *BCAS* interviews with three Nigerian winners of the program.

My Transforming Days with CAS —TWAS-CAS Fellowship Winner Dr. Emmanuel Iyayi Unuabonah's Story



Dr. Emmanuel Iyayi Unuabonah, now a TWAS Young Affiliate Fellow and a lecturer at the Department of Chemical Sciences, College of Natural Sciences, Redeemers University in Nigeria working on industrial wastewater treatment, won a TWAS-CAS Fellowship for Postgraduate Research in China in 2005 and spent a happy and productive time at the Nanjing Institute of Soil Science, CAS. In an interview with *BCAS* reporter SONG Jianlan, he shares a story about his transforming days.

BCAS: Thank you for agreeing to do the interview with *BCAS*. You came to the Nanjing Institute of Soil Science (NISS) under CAS for postgraduate research with support from the TWAS-CAS Fellowship for Postgraduate Research in China in 2005. Why did you choose NISS for your Postgraduate research?

Unuabonah: I chose NISS because I saw that they had the facilities I needed to work with such as Scanning Electron Microscope (SEM) and Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) in the

institute. Besides, I had seen a couple of articles written by my host Prof. L. Z. Yang (Prof. YANG Linzhang) in my research area and I felt he would be the right person to work with. I immediately wrote him through his email address on the institute's website. He was very nice and positive in his response. At the time I had just an article and I was scared of applying for the fellowship but he encouraged me to apply and hope for the best. I did and it turned out that I was selected for the fellowship. I was really happy.



BCAS: What did you focus on during your Postgraduate study at NISS?

Unuabonah: My research at Prof L. Z. Yang's Laboratory was focused on preparing a "water stable clay" adsorbent for the purpose of removing heavy metal ions from aqueous solution. By "water stable clay" I mean a clay material that is not colloidal in solution (yet active in removing metal ions from aqueous solution) which makes it difficult for it to be recovered from aqueous solution. Before then, there have been many reports on the use of clay minerals for the removal of heavy metal ions from aqueous solution, but the problem was that it was difficult to use clay minerals in fixed beds and on a large scale for water treatment because of very poor flow rate and extra cost of recovering them from filters. However, I successfully prepared a polymer, a modified form of a local clay material I got from Nigeria. The modified clay was even far more active in removing heavy metal ions from aqueous solution than the unmodified clay itself. Prof L. Z. Yang was very happy for this. There were other modifications I made on the clay material that improved the functionality of the clay mineral. They were also very successful in removing heavy metal ions from aqueous solution but they were not "water stable". Prof. Q. Sun (Prof. SUN Qingye) of Anhui University was also very helpful during my research at Prof. L. Z. Yang's Laboratory.

BCAS: Your current research focuses on the preparation of functional materials from locally obtained kaolinite clay and polymer-clay composites as ion-exchange resins, to explore their potential in industrial wastewater treatment as substitute for zeolites and activated carbon. How helpful is your study at NISS for your own research on functional



Dr. Unuabonah working at a lab of NISS.



Dr. Unuabonah with some of his Chinese Colleagues.

materials for industrial wastewater treatment?

Unuabonah: The laboratory in which I did my research was well equipped with basic research facilities and with the kind assistance of Prof L. Z. Yang and Prof Q. Sun, I was able to understand how to modify my clay material and characterize them. For the first time in my career I was able, then, to use the Scanning Electron Microscope (SEM) and X-ray Diffraction equipment to characterize my samples. I was able to see the morphology and crystal structure of my modified samples, which was quite helpful in writing my subsequent manuscripts for publication in international Journals. The use of the ICP-AES added more credibility to my results and I was able to get results as low as in microgram per litre ($\mu\text{g/L}$). All these put together encouraged me to develop more ideas that have helped me in my career today. One thing I appreciated for my stay in NISS was the freedom and the support given to me to develop my own research idea. This I can say was key to my success at NISS.

BCAS: Will you do (Or are you doing) any research in cooperation with your former colleagues at NISS? What is it about?

Unuabonah: To be candid, I want to return to Prof Yang's Laboratory on a research fellowship. I am still thinking of a research proposal we can both work on. Hopefully, I should return to the laboratory in NISS very soon.

BCAS: You were inducted as a TWAS Young Affiliate Fellow in 2009. What will you do in the future to promote science and education in your country and Africa?

Unuabonah: I will love to encourage high school children and postgraduate students to take up science as a career. Science research in Nigeria is taking a downward

turn because of lack of motivation. Already, some of us here in Nigeria as TWAS Young Affiliates, through the pioneering effort of the Nigerian Academy of Science (NAS) have started the Nigerian Young Academy (NYA) (www.nigerianyoungacademy.org) whose aim is to promote scientific research among young researchers in Nigeria. One of the present success of this Young Academy result is that most members of the Young Academy are already networking and collaborating in carrying out research that directly impact on the Nigerian society. We (the Nigerian Young Academy) are also currently involved in the Schlumberger Excellence in Educational Development (SEED) targeted at high school children. In this programme, the high school children in conjunction with their teachers come up with a simple project that is a research idea that solves societal need. This project is then approved and funded by the Schlumberger Foundation while we as young academy members serve as mentors to these children alongside members of the Nigerian Academy of Science. Another thing we have done is to try and establish awards for young scientists. Already, a yearly award for young scientists in Microbiology has been established by the Nigerian Young Academy and the first award will be given in May, 2013 (www.nigerianyoungacademy.org). We believe that this will stimulate young scientists in Nigeria to continue striving



Dr. Unuabonah with the president of the Nigerian Academy of Science and the president of the Nigerian Academy of Education during the inauguration of the Nigerian Young Academy.

for excellence in their scientific research. Already, we have planned some programs for the high school children and for postgraduate students where science research in Nigeria will be the central focus.

In Africa, some of us who are members of the Global Young Academy (GYA) (www.globalyoungacademy.net, www.gya.bbaw.de) are now encouraging the formation of Young Academies in African Nations to raise the profile of young researchers in such countries and thus make them role models to younger ones. In the coming months, you will see some of these Young Academies being established.

“Partnerships with Chinese Institutes Present the Best Opportunity for African Scientists to Modern Science”

—An Interview with Dr. Emeka Oguzie



Emeka Oguzie is a young materials scientist from the Department of Chemistry, Federal University of Technology at Owerri, Nigeria. In 2005, he successfully applied for the CAS-TWAS Fellowship and spent a postdoctoral year at the Institute of Metal Research, Chinese Academy of Sciences in northeastern China's Shenyang City. Today he has grown into an acknowledged expert in electrochemistry in Nigeria, conducting research on an international level by making green corrosion inhibitors from indigenous plant extracts. He also won a grant from TWAS to buy key experimental equipment for his own lab, and is now an Affiliate fellow of TWAS. In an interview with *BCAS* reporter XIN Ling, he shares some of his experiences in China.



BCAS: Why did you decide to come to China in 2005?

Dr. Oguzie: Deciding to come to China was not really very difficult. Chinese people have a reputation as a hard working and well organized people. I was amazed by reported science and technology developments in China, and most importantly, I felt that China had similar experience with present day Nigeria in the recent past and I could relate better with scientists and researchers from China and understudy the development trends. I was also very interested in experiencing Chinese culture and cuisine.

BCAS: Now you are running your own lab in Nigeria, do you still come back China and visit CAS colleagues?

Dr. Oguzie: Since my postdoctoral stay I have maintained close collaboration with the Institute and have visited them twice as a TWAS-UNESCO Associate. They actually always look forward to my visits. Also, I have assisted my colleagues in visiting the Institute as postdocs and have sent my first doctoral student there.

BCAS: What do you think are the immediate and far-reaching significances of such fellowship programs as the CAS-TWAS Fellowship for your country's scientific development?

Dr. Oguzie: A lot of benefits. Firstly, such fellowships provide the only opportunity for our scientists to make use of modern research facilities and techniques and thus remain relevant in research trends in the different fields. For instance, I actually consider the CAS-TWAS fellowship as the highpoint of my career (the internationalization of my career). The experiences and exposure derived from the fellowship makes me feel more competent, confident and self-assured in the work I do.

Long-lasting collaborations are also initiated by such fellowships, particularly as regards access to standard laboratory facilities, which means that our research proposals can incorporate such standard techniques and measurements that can be run with the facilities of the host institutions.

The immediate benefit of the fellowship programs is the development of the scientific research capacity of individual scientists, while the long term benefit is the creation of a pool of well trained scientists in different research areas, who could subsequently drive scientific development in the country whenever the right structures and enabling environment are put in place. This of course



Dr. Oguzie and Prof. WANG Fuhui, Director of the State Key Laboratory for Corrosion and Protection at the Institute of Metal Research, Chinese Academy of Sciences based in northeast China's Shenyang City.

will lead to enhancement of national scientific capacity.

BCAS: How's your lab in Nigeria going on? What is the biggest challenge for the lab at the moment? What do you suggest for designing and implementing more practical and efficient cooperation programs to help African scientists build their own career at home?

Dr. Oguzie: My biggest challenge is funding to better equip my lab as well as to facilitate more frequent visits to my collaborating Institute in Shenyang.

I think cooperation programs can be more efficient if the individual scientists can apply directly (as with the TWAS fellowships), rather than having to pass through some national agency or clearing house (with bureaucratic bottlenecks).

African scientists need to be able to design “home-grown” research projects that could be achievable with the facilities available in our home institutions as well as at a collaborating Institution abroad (say in China). In this way, the scientists could continually work and develop themselves further in this area both at home and abroad where they would have had some expertise and ultimately introduce innovations in the topic. It really does not make much sense to go into a fancy new area and then be unable to do any useful work upon return to their home institutions.

BCAS: How do you see the scientific cooperation between China and Nigeria in the last decade? What do you think are the main factors for a successful collaborative relationship between the two in the science and technology

sector? Do you have any plans to expand your partnership with CAS or scholars from other research institutions or universities in China?

Dr. Oguzie: Scientific cooperation between Nigeria and China is not as effective as it ought to be. Considering the immense benefits to be derived from such cooperation, I do not see any visible well articulated programs for such cooperation on the part of the Nigerian government. For instance, the opportunities I have had to visit China had no input from the Nigerian government. Partnerships and collaborations should be for mutual interests and benefits and the earlier we in Africa realize this, the better for everyone. We must be able to highlight what we have to offer (i.e. what the Chinese will benefit) and insist on what and what we expect from any investments or partnerships at the negotiating stage.

During my last trip to China, I visited the Institute of Chemistry, Chinese Academy of Sciences in Beijing to open up more collaboration opportunities for myself



On the frozen lake in the Summer Palace in Beijing.

and my colleagues. I had initially met with Director WAN Lijun at the TWAS meeting in Hyderabad, India (2010) and got invited to visit the Institute. Such partnerships with Chinese Institutes present the best opportunity for African scientists to modern science.

Shine Light on the Academic Darkness —An Interview with TWAS-CAS Fellowship Winner Prof. Joshua A. Obaleye



Prof. Joshua Ayoola Obaleye, a chemist dedicated to synthetic inorganic/spectroscopic studies, now a professor of inorganic chemistry and former dean of the Faculty of Science, University of Ilorin of Nigeria, is a fellow with many national and international professional associations. In 2008 he won the TWAS-CAS Fellowship for Visiting Scholars in China to work for three months at the Institute of Chemistry, CAS in 2008. In the interview with BCAS reporter SONG Jianlan, he recollected the catalytic scenarios at IOC and the chemistry between him and his ICCAS colleagues.

BCAS: *Thank you for agreeing to do an interview with BCAS. You joined the CAS Institute of Chemistry, CAS (ICCAS) as a visiting scholar with support from the TWAS-CAS Fellowship for Visiting Scholars in China in 2008. Why did you choose ICCAS to do your research? Why are the studies at ICCAS attractive to you?*

Obaleye: Firstly, I want to express my appreciation to both TWAS and CAS (Chinese Academy of Sciences) for counting it worthy to shine light to the academic darkness of the less privilege nations of the world and the wonderful opportunity through this joint effort to bring, especially African nations, to the high level of academic recognition



Prof. Joshua Obaleye is seen with Prof. SUN's group at ICCAS, an international team composing of postdoctoral researchers, Ph.D. students, M.Sc. students and research assistants. This team then had researchers from Nigeria, China, Pakistan and others, including TWAS-CAS Fellowship winners.

through Science. I chose ICCAS for my research because of the good name of the Institute, the friendly relationship to foreigners, and well-equipped facilities available in the Institute. Prof. Wen-Hua Sun (Prof. SUN Wenhua) played a significant role by accepting my request to serve under him as my supervisory host and to benefit from both his research team and him. His invitation, which was approved by TWAS and CAS, has changed my research perspective tremendously. The content and tone of his letter written to me and his quick response to all my mails at the genesis of my application for the scholarship then geared me up and made me think that the task ahead would be a rewarding one. The task truly was greatly rewarding.

I have no regret at all, but a sweet memory of breakthrough of my long hungry desire to work in a Chinese laboratory. My studies at the Institute of Chemistry were attractive to me in diverse ways:

i) My first time visit to Madam Fu's office* revealed high level of humility that was displayed by her. Madam Fu provided a relaxing environment by her willingness to satisfy all my needs in order to make my stay in the Institute a comfortable one.

ii) The readiness of Prof. Wen-Hua Sun to expose me to his different research enriched my knowledge and gave me opportunity to generate novel hypothesis as pertaining to my research effort. This new idea was my focus as I returned back to my laboratory at the University of Ilorin in Nigeria.

iii) Availability of reagents and facilities for characterization of our products made my stay an attractive one.

iv) Seeing different people from different nations working in the same laboratory, sharing ideas and techniques in solving scientific problems have added value to the attraction I have for ICCAS.

v) Prof. Wen-Hua Sun is a hardworking scientist who is quite elated when there is a new discovery in his laboratory. He detests laziness and hence he wants all working under him to be like him. This component of this great chemist puts all his research team members on their toes. Everyone was kept busy and I love this.

vi) Finally, weekly report of research data in the form of a seminar was part of the attractions derived.

BCAS: What did you specifically focus on during your visit at ICCAS? What was the object of your study at that stage? Would you share with us the most impressive moments of your visit to ICCAS?

Obaleye: I focused on homogenous catalysis & metal-drug complexes synthesis. Prof. Wen-Hua Sun, my host, joyfully revealed the research activities in his laboratory to me, of which I seized the opportunity to absorb what needed to be absorbed. I also did the same to him. Based on this release of research background knowledge and exchange of ideas for mutual benefit, an agreement was reached on catalysis investigation of some of my research work involving synthetic metal-drug complexes. I edited some research reports conducted in the laboratory for publication in some reputable journals. I was also exposed to easy utilization of information and communication



Prof. Obaleye and his host at IOC, Prof. SUN Wenhua at the lakeside of Summer Palace in Beijing.

* The "office" refers to the TWAS Beijing Office, and Madam FU Shuqin is the Director of the office.



With Amir Badshah, a Ph.D. scholar from Pakistan at Prof. SUN Wenhua's lab.

technology (ICT) as related to assessment of research articles as a guide in research work. This has been of great benefit since I returned to Nigeria. I also presented a widely publicized seminar on “Development in Metal-Antimalarial Complexes: Synthesis, Crystal Structures and Biological Potency”. The Seminar generated novel ideas, which later led to further interesting investigations. I am hoping it would also serve as a source of future collaborative work possibly in Prof. Wen-Hua Sun’s laboratory. As earlier mentioned, I was involved in the weekly seminar presentation based on work carried out per week.

The main objective of my study was to learn different synthetic techniques of the mentioned complexes and their catalytic properties. In Prof. Sun’s lab, different researchers had their different experiments. Opportunities were available for interaction. I enjoyed asking questions, of which answers were also provided.

The most impressive moments of my visit to ICCAS were the social activities arranged for me by my host. We were able to visit important recreation centers after long hours of laboratory work. On one occasion, we were at the beach quenching the stress of lab work. Special dinner and lunch were organized for me, with the Deputy Director of the Institute of Chemistry and few other important dignitaries of the center in attendance. A short meeting was also arranged with Madam Fu. Despite her busy schedule, she still managed to organize a special lunch with me and invited some members of her cabinet to grace the occasion. The hospitality was just extremely explicit with the scenario full of excitement. It was like a long time dream that just became a reality. Pictures were taking in all social and laboratory activities. I could not bear what I saw and experienced, hence I found it reasonable

to purchase a new digital camera that would not fail me in capturing all these events. Every bit of my activities was a lesson that should not be allowed to vanish without having record of them. They were all heaven on earth events. The last time I had similar experience of this nature was in 1981 after the completion of my Ph.D. degree in U.S.A. when friends from different part of the world came to rejoice with me. The second time was during my visit to the *Instituto Venezolano de Investigaciones Cientificas* (IVIC), Caracas, Venezuela between 9th to 20th September, 1991 when attending a training course sponsored by ICS (the International Centre for Science) on “Organometallic Chemistry—a basis for Catalysis”. The event experienced during a chartered flight arrangement by the Venezuela government for all the international participants in which we were moved from Caracas to Flamingo Beach Hotel in Margaritan Island. My activities in China catapulted my research focus to a new turn of excellence. I feel more satisfied and fulfilling now with my research work.

BCAS: *Did you have any difficulty adapting yourself to your study and life in China?*

Obaleye: I had no difficulty at all in adapting to my study and the life in China. There were few occasions when language seemed quite challenging, but this was solved by either arranging a taxi for me to take me wherever I wanted to go, or asking any member of the research team or himself to take me there. The chemicals required for the research were always available, and the equipments were working perfectly. A computer system was available as a back-up for my laptop. Analyses of samples were done without any challenge. The laboratory was available 24 hours a day. Life in the laboratory and in the town was pleasant. Being



Prof. Obaleye jubilating with his colleagues at a restaurant where a special dinner was organized for him.

honest, I found Chinese friendly, cooperating and always willing and ready to be of help. Taxi/bus expenses, postage of books and minor miscellaneous expenses were paid. Besides, I was accommodated in a comfortable apartment. I have no regret at all. I was made to enjoy Chinese food by tasting all varieties of Chinese food during the period. I now understand the reason for the outstanding achievement of China at this jiffy.

BCAS: How helpful is your experience at ICCAS for your own research on synthetic inorganic/spectroscopic chemistry in your own country?

Obaleye: My experience at ICCAS for my research is tremendously helpful. It has helped my research in both methodology and characterization of products. I was exposed to new facilities, new and different research approaches and techniques. The potential derived from this visit was enormous and I am immensely grateful to both TWAS and CAS for these free opportunities and exposure to greater height in our academic/research endeavor. The effective uses of ICT in my research are now paramount and abound in my current laboratory. My visit to ICCAS has inspired me to restructure my laboratory and made it conducive for excellent work. Synthetic Chemistry is now easy to impart on students through easy teaching.

BCAS: Are you doing any research in cooperation with your former colleagues at ICCAS? What is it about? How will this project benefit your country, the developing world, and your own research area?



Prof. Joshua Obaleye on an outing to the Great Wall with Dr. Segun Olaseni (middle), a Nigerian fellow, and their Chinese colleagues.



With Mme FU Shuqin, Director of TWAS Beijing Office at CAS.

Obaleye: The linkage between me and my host is still intact. He has requested my input in some issues and I have published some of the work I did during my time at the ICCAS. I have presented the work at the 39th International Conference on Coordination Chemistry (ICCC39) in Adelaide, Australia. Similar work will be presented at the ICC40 in Valencia, Spain between 9 and 13 September, 2012. All things being equal, I wish to re-visit ICCAS in 2013 in order to strengthen our collaborative efforts.

This work would help improve the relationship between my University and CAS. Efforts would be made to endorse memorandum of understanding between the two Institutions. Because my institution is one of the best institutions in Nigeria established by the Federal Government of Nigeria, my exposure will indubitably improve the research activities of my country and effective teaching inclusive. As a fellow of many professional national and international bodies, there is no way the developing world will not have a taste of this advancement.

I want to salute TWAS for caring for the academic growth of the third world and for the perfect strategy and resources made available to implement the ideas of filling the gaps and loopholes in the developing world. I am immensely grateful to CAS, Madame Fu, Prof. Wen-Hua Sun, his research team and the ICCAS for their effective and efficient efforts in the development of Chemistry and Science as a whole. I finally salute University of Ilorin, Nigeria, and Science and Technology Education Post Basic Project (STEP B) for their roles at enabling me acquire these skills.