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It is a great honour for me to stand here at this moment to welcome you to the LAUTECH NANO 2019 conference on behalf of the LAUTECH Nanotechnology Research Group (*NANO<sup>+</sup>*). This conference marks the third in the series of scientific events to be organized by the research group, with the intention to promote discourse on nanotechnology among academia, technocrats, policy makers, industrialists, entrepreneurs, students and the general public. It is our candid opinion that through such efforts, a roadmap would be channeled for the participation of the country in nanotechnology and the nation would benefit from the abundant opportunities that nanoscience and nanotechnology seek to offer for our national development. Thus, in 2017, we organized a workshop on synthesis, characterization and applications of nanoparticles, which was followed in 2018 with workshop/conference themed: *Nanotechnology for sustainable development: prospects for Africa*. This year's event is also workshop/conference with the theme: *Nanotechnology applications in Africa: opportunities and constraints*. We have invited seasoned researchers to discuss this topic for the benefits of all and sundry, aside the fact that more than eighty (80) presentations would be made by scholars in diverse areas at the 2-day conference.

Mr. Chairman, permit me to inform this gathering about the research group. The precursor for its formation was critical deliberations among three longtime friends (Prof. A. Lateef, Prof. T.A. Yekeen and Dr. M.A. Azeez) who saw the need to form a multidisciplinary research team with the focus on promotion of nanotechnology research at its finesse. The group formally came into being on September 4, 2014 at a meeting held in my research laboratory, Laboratory of Industrial Microbiology and Nanobiotechnology. The group has since blossomed from initial members of five to reach eleven at the moment with expertise in microbiology, biotechnology, environmental toxicology, plant biology and breeding, molecular biology, materials science, nanofabrication, nanotechnology, mechanical engineering, renewable energy, physics, biochemistry, and cancer research. In the five years of existence of the group, we have

put LAUTECH at the front burners of nanotechnology discourse in this country, with the modest achievements as follows:

1. Contributions to knowledge in the field of nanotechnology. Members have contributed more than fifty (50) research items in reputable and high impact journals in this area in the last five years. One of us also holds international patent, as we make concerted efforts at developing nano-based products.
2. National and international collaboration with Universities in Nigeria, Saudi Arabia, South Africa and India. Through the collaboration, a PhD student had the opportunity to work on advanced characterization of nanoparticles in a foreign laboratory through a 6-month fellowship.
3. Human capital development in the training of several undergraduate and postgraduate students. At least six M. Tech graduates have been produced with several M. Tech and PhD students carrying out investigations in this area at the moment. Suffice to say that we have also mentored several colleagues in LAUTECH and other institutions in Nigeria.
4. Popularization of nanotechnology and activities of the group through web presence ([www.nanotech.lautech.edu.ng](http://www.nanotech.lautech.edu.ng)) which was launched on 24 June, 2016 with visitation in excess of 100,000 and publications in several international media and national dailies.
5. Operation 'catch them young' to bring discussion on nanotechnology to the fore among primary and secondary school students through their invitation to our programmes. At this event, prizes would be awarded to the winners at this year essay competition titled 'Nanotechnology for developmental change in Nigeria' that held on 16 October, 2019.
6. Successful organization of national workshop (21-24 August, 2017), and international conferences (23-25 October, 2018; 22-24 October, 2019).
7. Publication of a special edition of *Science Focus*, volume 23 (2): 2018 in partnership with the faculty of Pure and Applied Sciences, LAUTECH, Ogbomoso as proceedings of LAUTECH NANO 2018.
8. Partnership with the Institute of Physics (UK) which was founded in 1874 to publish papers to be presented at LAUTECH NANO 2019 in Scopus-indexed *IOP Conference Series: Materials Science and Engineering*.

It is on this note that I wish to appreciate all members of the group for their commitments to the aspirations of the group, and for accepting me to lead the group thus far, despite my shortcomings. Your resilience always put me on the spot that we must not fail. I must thank you for the attendance at about sixty (60) scientific meetings of the group that have been held in the

last five years. I'm grateful to you for tolerating my excesses and for overlooking my weaknesses. Together, we have been more refined, focussed and productive.

Mr. Chairman, the science of nanomaterials has come to stay with mankind, as it has been discovered that this novel utilization of resources can lead to creating new range of materials to solve myriads of problems that confront mankind ranging from food insecurity, insecurity and terrorism, diseases, energy crisis, pollution, water scarcity, climate change, unemployment among others. For all of these, nanotechnology, which deals with the creation, manipulation and applications of materials at nanoscale ( $10^{-9}$  m), can be deployed to herald solutions to the problems to provide healthy living, engender peace and create economic prosperity for mankind. Our thought is that Africa and indeed our country, Nigeria should not be left out in this revolution. Therefore, concerted efforts should be made by all the stakeholders in the country to ensure that R&D in nanotechnology is prioritized for the benefits of the country. In my latest exposé on green nanotechnology research in Nigeria that was published last month, we have identified adequate funding, provision of functional facilities, curriculum development and re-engineering, development of national policy on nanotechnology, and manpower development as critical inputs needed to position Nigeria as a player in nanotechnology R&D in Africa. In this connection, LAUTECH is ripe enough to host a national centre of excellence in nanoscience and nanotechnology. We have the zeal, we have the expertise, and we have demonstrated the will and capacity to lead. We shall be pleased to have critical stakeholders such as the Federal Ministry of Science and Technology (through the National Steering Committee on Nanotechnology Policy in Nigeria), Tertiary Education Fund (TETFund), industrialists, and philanthropists to look in this direction. Also, we appeal to the University to seek a special intervention from TETFund to equip the Central Research Laboratory with advanced equipment that include FTIR, XRD, AFM, SEM, TEM, particle size analyzer, fluorescent microscope, TGA amongst others. I would also use this opportunity to re-echo the yearnings of LAUTECH community by appealing to the governments of Oyo and Osun states to jettison politics and seek a workable funding plan for the sustenance of the University. It was a generation that established the University; it is the responsibility of this generation to ensure its survival and growth. The promising and the best state University in Nigeria should not be allowed to slip in to another round of needless crisis.

On behalf of the group, I wish to thank profoundly the honourable minister of science and technology, Engr. Dr. Ogbonnaya Onu for the support for our group. Consistently, he has found time to be associated with our aspirations in nanotechnology research. He was represented at the 2018 edition by Late Prof. Muhammad A. Umar (May his soul rest in peace), and this edition has also attracted his attention. Thank you, Sir. We are also grateful to the permanent secretary, FMST, Mr. Bitrus B. Nabasu *nni* and the chairman of the national steering committee on nanotechnology policy, Mr. Akinyemi O. Oyefeso for their assistance all the time. I wish to place on record, the love that have been shown to us by my former teacher and the Pro-Chancellor/Chairman of the governing council of LAUTECH, Prof. Oladapo O. Afolabi *OON, CFR*, whose words of encouragement and encomiums have defined us at high places. It is a great honour to sit with you, Sir on the governing council of my *alma mater*. I also thank distinguished members of University Senate that elected me into the governing council of LAUTECH. The group is grateful for the recognition and support offered by the immediate past administration of the University, under the leadership of Prof. Adeniyi S. Gbadegesin, whose tenure witnessed the birth and blossoming of the research group. The present administration of this University under the leadership of my teacher, Prof. Michael O. Ologunde is also deeply appreciated for the support for the group. The administration has not wavered to accord due recognition to the activities of the group. We are grateful, Sir. I thank all our past and present academic leaders in the University; Provost, College of Health Sciences, Deans of Postgraduate School and faculties, Directors of centres and units, and Heads of Departments for your support for our activities.

Permit me to specially thank our indefatigable Dean of faculty of Pure and Applied Sciences, Prof. Abiodun T. Oladipo for his pristine love for the group. He has used all means within his power to support the group. We thank you, Sir for fulfilling all the pledges that you made to the group, most especially the allotment of a special issue of *Science Focus* {volume 23 (2)} for the publication of some papers that were presented at LAUTECH NANO 2018. I appreciate the editorial team of the journal headed by Prof. Olugbenga S. Bello in ensuring the publication of the special edition. I sincerely thank our teachers and mentors, Professors, members of academic and non-academic staff of the University for your words of encouragement and enthusiasm. For our friends, colleagues, collaborators, companies, schools, media houses, and other supporters; we so much value your supports for our activities. I also

thank all the participants for creating time to attend this programme. You shall be glad that you did. Several of our colleagues have voluntarily offered to serve as chairmen, rapporteurs, and assessors at the technical sessions; you are appreciated for the kind gesture. We most sincerely appreciate distinguished Senator AbdulFatai Buhari *PhD* for his contribution towards the success of this conference, and his unfettered interest in the growth and development of LAUTECH.

I must place on record, the eminent roles that have been played by our undergraduate and postgraduate students in spurring us to learn more in this new field. We appreciate your resilience and the eagerness to learn new things. You are all appreciated for your contributions to knowledge in nanotechnology. We appreciate '*the young shall grow*'; the younger generation represented by the pupils of LAUTECH Staff School and other secondary schools here present for being part of our quest to reach wider audience since 2017. The effort is paying off, as some of you would be recognized for their wizardry on nanotechnology discourse. To the *NANO*<sup>+</sup> family; our spouses and children, we thank you '*nanostically*' as we journey together in this pursuit. May you all be blessed. Finally, to the almighty God; we adore you, it is you that we worship and to you we return all the glories.

**BEING THE TEXT OF ADDRESS DELIVERED BY THE DEAN OF FACULTY OF PURE AND APPLIED SCIENCES, CHAIRMAN, COMMITTEE OF PROVOST AND DEANS, AND THE CHIEF HOST, PROF. ABIODUN T. OLADIPO AT THE OPENING CEREMONY OF LAUTECH NANO 2019 CONFERENCE**



It is an honour for me to extend my warmest greetings and to congratulate LAUTECH Nanotechnology Research Group (*NANO*<sup>+</sup>) on her 5<sup>th</sup> year anniversary having been founded on 4<sup>th</sup> September, 2014 and the laudable organization of this workshop/conference (LAUTECH NANO 2019), aimed at increasing awareness and discussing the applications of nanotechnology in Africa by examining the opportunities and constraints. I consider this 3<sup>rd</sup> workshop/conference as relevant and timely. LAUTECH is renowned for its pride heritage of commitment to research and learning, which this year's event is intended to demonstrate. At the LAUTECH NANO 2018, I made a promise as the Dean of Faculty of Pure and Applied Sciences, and the Editor-In-Chief of *Science Focus*, the flagship journal of the faculty that a special edition of the journal would be dedicated to the publication of some of the papers that were presented at the conference. I am happy to inform you that the promise had been fulfilled with the publication of the special edition (volume 23, issue 2). The articles are available on-line with DOI numbers. This undoubtedly is an institutional support for the activities of the group, which we most treasure. The group had briefed me that it has partnered with the Institute of Physics (UK) that was founded in 1874 to publish some of the papers to be presented at this conference in '*IOP Conference Series: Materials Science and Engineering*' which I encourage the presenters to make maximum use of the opportunity. I applaud your research group; appreciate your positive attitude and your ability to motivate researchers to contribute to a good cause in the academic environment. You are highly leading by example when it comes to positivity. I am sure we shall be seeing and hearing a great deal more about your achievements in the future. Keep up the good work. I wish you continued success for many years to come. Once again, Congratulations and thank you for giving this University your best.

**WELCOME ADDRESS DELIVERED BY THE VICE-CHANCELLOR, PROF. MICHAEL O. OLOGUNDE DURING THE OPENING CEREMONY OF THE 3<sup>RD</sup> EDITION OF WORKSHOP AND CONFERENCE ORGANIZED BY THE LAUTECH NANOTECHNOLOGY RESEARCH GROUP HELD ON OCTOBER 23, 2019 AT THE HALL, LAUTECH, OGBOMOSO**



Protocols. I am delighted to welcome you to the third edition of annual Workshop/Conference organized by LAUTECH Nanotechnology Research Group (*NANO*<sup>+</sup>). This year conference is themed '**Nanotechnology in Africa: Opportunities and Constraints**'. Let me say that today is another important day in the life of this University as LAUTECH is being projected on a global scale. Our University is back on track, and we are indeed open for serious academic business. I recognize the *Honourable Minister of Science and Technology, Federal Republic of Nigeria, Engr. Dr. Ogbonnaya*

*Onu*, our distinguished Senator AbdulFatai Buhari, the keynote speaker; Prof. A.S. AbdulKareem, invited guest lecturers as well as all the attendees from over 40 institutions from all the six geopolitical zones in the country. The Honourable minister Sir, we are grateful for the recognition that you have accorded the organizers of this conference (*NANO*<sup>+</sup>), and indeed the University for gracing this occasion. Last year, you were eminently represented by late Prof. Muhammed A. Umar of NASENI (May his soul rest in peace) at LAUTECH NANO 2018 with the call on Nigerian researchers to utilize nanotechnology for the development and advancement of our nation. We are aware of your giant strides in science and technology in general, but we are particularly delighted that you have recognized the importance of nanotechnology in modern day development by putting in place a steering committee to engender a national policy on nanotechnology. We plead that as trailblazer in this emerging field, LAUTECH Nanotechnology Research Group (*NANO*<sup>+</sup>), and indeed our University should be remembered in the scheme of things to host centre of excellence in nanoscience and nanotechnology in Nigeria. The research

group has consistently proven to be leader in this field in the country, and has the capacity to deliver in terms of generation of knowledge, training of manpower and product development.

I was informed that over one hundred participants from 35 institutions across the country attended the NANO conference in 2018, and some of the papers presented have been published in the special edition of *Science Focus*, a flagship journal of the *Faculty of Pure and Applied Sciences, LAUTECH*. So, it is not surprising that a better feast is being recorded this year. During the visit of the organizers, I was told that accepted manuscripts from this year conference would be published in the conference proceedings of the *Institute of Physics* founded in 1874 in the UK under *IOP Conference Series: Materials Science and Engineering* which is indexed in Scopus. This is a milestone as the group marks the 5<sup>th</sup> year anniversary of its formation. I am sure that most of the attendees will utilize the opportunity of publishing their works in the top conference proceeding. I salute *NANO*<sup>+</sup> for the ‘*operation catch them young*’ as I can see pupils and students from selected primary and secondary schools across Ogbomoso. This is indeed commendable. Earlier, the group organized an essay writing competition among senior students of some selected secondary schools on ‘*Nanotechnology for developmental change in Nigeria*’. At this event, the winners at the competition would be duly recognized.

Ladies and gentlemen, let me start from the historical background of nanotechnology. At the annual meeting of American Physical Society held in California Institute of Technology in 1959, Richard Feynman delivered his epoch making speech titled ‘**There’s Plenty of Room at the Bottom**’. Feynman proposed the possibility of designing, creating and manipulating matters at the atomic scale which accordingly would lead to miniaturization of devices and structures. He suggested that it wasn’t impossible to construct nanoscale machine by arranging atoms the way we wanted. At the top of his vision was the possibility of ‘swallowing the doctor’ which involved building tiny, ‘*swallowable*’ surgical robots that can go into any part of our bodies and carry out surgical operations with unparalleled accuracy and precision. This concept historically gave birth to nanotechnology.

Nanotechnology is a multidisciplinary field in which material scientists, physical scientists, agriculturalists, engineers, life scientists and medical personnel find common interests. Being all encompassing, its applications are wide and expansive, traversing energy capturing technology, bioimaging, electronics and sensor technology, pollution control, water treatment



technology, drug delivery and disease control, food and feed technology, agriculture, biomedical and textile. Common application examples are our mobile phones with multifunctional ability and very large storage capacity (some models are scratch and water resistant), flat screen television and solar panels in our homes among others. No wonder that the call for abstracts attracted scientists from different fields and institutions to participate in this year workshop and conference.

I have no doubt that nanotechnology is beginning to take shape in Africa and Nigeria, in particular. Nanotechnology presents opportunities to solve the continent's myriads of problems ranging from food production and storage to disease control and environmental remediation. However, many challenges including funding, power and political commitment are expected to stand on our ways as we break into the world of miniaturization. Perhaps, this is the direction of thought of the organizer of this conference, and might have seriously influenced the coinage of the theme. I am sure the invited speakers would do justice to this theme. I am therefore greatly elated seeing LAUTECH as a pacesetter by having a dynamic and formidable research group at the forefront of this thought-provoking technology.

LAUTECH Nanotechnology Research Group (*NANO*<sup>+</sup>) which was formed on September 4, 2014 with the vision of being a leading research group in Nigeria focuses at providing high quality research, training programmes and research findings in the area of nanotechnology. The group, ably led by Prof. A. Lateef, has trained undergraduate and postgraduate students cumulating into over fifty (50) research articles in reputable journals. I have to say here without mincing words that substantial parts of most of these investigations were carried out using the facilities in the University with the aspects of the advanced characterization done in the laboratories of the group's collaborators based in South Africa and the kingdom of Saudi Arabia. Therefore, organization of this workshop/conference is a step further in the pursuit of the lofty goal and aspiration of the group. Let me also say that on February 11, 2019 during the induction leading to my inauguration as LAUTECH's Vice-Chancellor, one of the resource persons (Dr. R.L. Shepard from the United States who is also my friend and mentor of 30 years) conspicuously displayed group's website, spoke highly of their activities, especially the potentials for the development of the University. Coincidentally, the Chairman of the group was present during the retreat as a member of the University governing council. *NANO*<sup>+</sup> has a

commendable web presence, and its activities have been given wider coverage by the media (Nigerian Tribune, Guardian, Daily Independent and The Business Day newspapers) to disseminate information about nanotechnology which ultimately promotes the image of the University.

Ladies and gentlemen, I have that strong believe that the crop of scientists behind promotion of nanotechnology as frontier of knowledge have the wherewithal to take the University, our dear country and Africa at large to greater heights in knowledge dissemination and advancement of humanity. Therefore, the University shall continue to play her own part by investing in the provision of equipment that will spur cutting-edge and translational research for the benefit of all. I wish to congratulate the organizers and the participants in this groundbreaking event and encourage all to tap on the knowledge offered by this occasion for successful exploitation for human development. It is therefore, with all enthusiasm, that I formally declare this conference open to the glory of God and service to humanity. Thank you.