

WELCOME ADDRESSES

Prof. A. Lateef

Host and Head, Nanotechnology Research Group (NANO⁺), LAUTECH, Ogbomosho, Nigeria

I am delighted to welcome you to the 6th international conference on nanotechnology of our research group, LAUTECH Nanotechnology Research Group (NANO⁺) in collaboration with the National Space Research and Development Agency (NASRDA), with the theme 'Nanotechnology for Socio-economic Development of Africa'.

This is the first time that our conference will be held outside our University, LAUTECH which is a milestone in our quest to partner with stakeholders to deepen nanotechnology discourse in the country and beyond. I thank the Director-General of NASRDA, Dr. Halilu A. Shaba and his worthy team for the partnership. At this conference, we will listen to 12 invited lecturers and 73 abstracts will be presented.

The impact of nanotechnology on economic development is huge; with estimated worth of \$3 trillion in 2020, provision of about 6 million jobs and it has been predicted to account for 10% of the world's GDP by 2030. Africa must not watch in the unfolding scenario that nanotechnology presents, and the time to act is now.

Nanomaterials are exploited in all facet of human endeavours, and the applications increase daily - food and agriculture, health, industries, engineering, environment, security and defence, water, energy, sport, and consumer products/services. They represent potent tools that can be used to deliver on the SDGs of UN.

In the quest to place Nigeria among comity of players in nanotechnology, our multidisciplinary research group, which was formed in 2014, has made contributions to promote nanotechnology R&D in Nigeria. They can be summarized as follows:

1. Organization of workshops/conferences on nanotechnology in 2017, 2018, 2019, 2020, 2021 and publications of conference papers in Nigeria (*Science Focus; Nano Plus: Science and Technology of Nanomaterials*) and United Kingdom (*IOP Conference Series: Materials Science and Engineering*).
2. Mentoring of students and academics in more than twenty universities and other institutions in Nigeria and beyond, as well as expanding the outreach of nanotechnology discourse to students of primary and secondary schools.
3. We have deepened nanotechnology discourse in several electronic and print media in culminating in more than 40 press releases/interviews. Our website (www.lautechnanotech.com) is robust, informative, and regularly updated. Since its launch in 2016, it has received more than 124,600 visitors.
4. Members of NANO⁺ remain the most prolific in nanotechnology R&D in Nigeria having published more than 150 articles in various areas of nanotechnology since 2015. Five members of the group emerged among the

top 12 nanotechnology researchers in Nigeria as indexed in Scopus (2010-2020).

5. Development of nano-based products: nanopaints, nanotextiles, nanopesticides, nanobiocides, nanofertilizers, nanoadsorbents, nanofilters and DSSCs.
6. Establishment of the first specialized journal on nanotechnology in sub-Saharan Africa, '*Nano Plus: Science and Technology of Nanomaterials*'.

It our fervent hope that these efforts and those from other sister research groups on nanotechnology and scholars in this field will be complemented by the government at providing us with policy guidelines on nanotechnology R&D in Nigeria and dedicated capital to develop nanotechnology infrastructure.

South Africa that we started the nanotechnology journey together in 2006 has dedicated more resources in this area, and has now moved to translational research. It has developed nano-based products, standards and has commendable number of patents. It has succeeded in completing a 10-year development plan on nanotechnology (2010-2019). For us, as a nation, we need to move faster to benefit from the fruits of nanotechnology. Iran, despite all manners of sanctions realized \$550 million from nanotechnology enterprise in 2020, with projection of \$1 billion by 2025.

I therefore call on the federal government of Nigeria to finalize the passage of nanotechnology policy on nanotechnology, establish an agency to drive nanotechnology agenda for the country, and dedicate funds for its promotion and R&D. Establishment of centres of excellence in nanotechnology is germane to realize the lofty potentials of the country in this field, and with the leadership that we have offered, LAUTECH deserves to host such centre. This challenge should be taken up FMSTI, TETFund, NASENI, NASRDA and angel investors.

On behalf of my group, I appreciate the honourable minister, STI, the permanent secretary, the Director of Chemical Technology in the ministry for the various supports offered to the group since 2018. I appreciate the leadership of LAUTECH (past and present) for believing in us and support for our cause. We appreciate the recognition that was given to our group during the 14th combined convocation ceremonies of the University in April, 2022. I equally thank all our colleagues in academia, our guest lecturers, LAUTECH community, collaborators, enthusiasts, industrialists, sponsors, students, pressmen and family members for supporting our activities over the years.

Once again, I welcome you to LAUTECH-NASRDA NANO 2022 and wish us fruitful deliberations and a rewarding experience at the conference.

Thank you and God bless.

SPEECH PRESENTED BY DIRECTOR-GENERAL AND CHIEF EXECUTIVE OFFICER, NATIONAL SPACE RESEARCH AND DEVELOPMENT AGENCY (NASRDA), DR. HALILU A. SHABA AT THE OPENING CEREMONY OF THE 6TH INTERNATIONAL WORKSHOP/CONFERENCE ON NANOTECHNOLOGY

Protocols:

I welcome you all to our beautiful campus for this very important workshop/conference. Our objective at NASRDA is always to work with all stakeholders in promoting the frontiers of new and emerging technology in order to provide solutions to problems that are peculiar to us as a Nation using Space Science and Technology for socioeconomic development.

I want to use this occasion to congratulate the LAUTECH Nanotechnology Research Group (*NANO+*) for its tenacity and commitment to the expansion of the frontiers of knowledge in the area of Nanotechnology. The 6th annual workshop/conference is the testament of your commitment. At a time when most organizations and associations are finding it difficult to organize a conference, you have kept the flag flying even during Covid-19 pandemic.

Nanotechnology is the manipulation of matter on a near-atomic scale to produce new structures, materials and devices. The technology promises scientific advancement in many sectors such as medicine, consumer products, energy, materials and manufacturing. Nanotechnology refers to engineered structures, devices, and systems. Nanomaterials have a length scale between 1 and 100 nanometers. At this size, materials begin to exhibit unique properties that affect physical, chemical, and biological behavior. Researching, developing, and utilizing these properties is at the heart of new technology.

Space Science and Technology is the ultimate frontier of technological innovation, hence, NASRDA cannot take a back seat in the area of innovation. It is consequent upon this that the collaboration with the LAUTECH Nanotechnology Research Group is of optimum importance. We will do all that is expected within our ability to ensure that this relationship yields a result that is beneficial to Nigeria in particular and the world in general.

I welcome you once more to Obasanjo Space Centre, the campus of the premiere Space Agency in Africa. Have a wonderful deliberation.

Thank you

**WELCOME SPEECH DELIVERED BY THE ACTING VICE-CHANCELLOR OF
THE LADOKE AKINTOLA UNIVERSITY OF TECHNOLOGY (LAUTECH),
OGBOMOSO, PROFESSOR MOJEED OLAIDE LIASU AT THE 6th
INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY ORGANIZED BY
THE NANOTECHNOLOGY RESEARCH GROUP (NANO⁺) OF LADOKE
AKINTOLA UNIVERSITY OF TECHNOLOGY, OGBOMOSO IN
COLLABORATION WITH THE NATIONAL SPACE RESEARCH AND
DEVELOPMENT AGENCY (NASRDA) HELD ON NOVEMBER 22-25, 2022**

*The Honourable Minister, Science, Technology and Innovation, Federal Republic of Nigeria, Senator Adeleke Mamora,
Permanent Secretary, Federal Ministry of Science, Technology and Innovation,
Director-General of NASRDA, Dr. Halilu A. Shaba,
Principal Officers, Ladoke Akintola University of Technology, Ogbomoso
Directors-General of Agencies and Institutes,
The Lead Speaker,
Invited Lecturers and all other attendees from across the globe,
Ladies and gentlemen,*

I am glad to be here today to welcome you to the 6th International Conference on Nanotechnology with the theme 'Nanotechnology for Socio-economic Development of Africa'. This year's conference is organized by our illustrious Nanotechnology Research Group (NANO⁺), in collaboration with the prestigious National Space Research and Development Agency (NASRDA) to forge a common front at promoting nanotechnology R&D in Nigeria and beyond.

Going down the memory lane, NANO⁺ started advocacy on nanotechnology in 2017 by exposing scholars to rudiments of synthesis of nanoparticles and their applications. By 2018, activities of the group attracted the attention of the Federal ministry of science, technology and innovation, with their participation in their conferences. So, we are happy at the current milestone, that an agency of federal government has partnered with the group to organize LAUTECH-NASRDA NANO 2022. This is highly commendable.

Ladoke Akintola University of Technology, Ogbomoso, the best state University in Nigeria has come of age, and is currently well-ranked among her peers. This year, the University was ranked as the 10th in Nigeria by the Times Higher Education (THE). These feats would not have been possible without excellent researches and dedicated staff of the University. In April this year, the University recognized some of our outstanding scholars of which two members of NANO⁺ were among; Prof. A. Lateef and Prof. M.A. Azeez. The contributions of the research group to the growth of the University were also acknowledged in my speech at the 14th combined convocation ceremonies.

The Honourable minister Sir, LAUTECH has established itself as a leader in nanotechnology enterprise in Nigeria, and should be supported for greater achievements. Five of our scholars are among the top 20 scholars of nanotechnology

in Nigeria going by papers indexed in Scopus in a decade (2010-2020). I therefore call on you to use your good office to mobilize supports for the establishment of a centre of excellence on nanoscience and nanotechnology at LAUTECH, Ogbomoso. Our NANO+ has demonstrated competence in cutting-edge research, publications, training, and mentoring towards creation of critical mass of experts in nanotechnology. The group also established the first journal of nanotechnology (*Nano Plus: Science and Technology of Nanomaterials*) in the sub-Saharan Africa.

Nanotechnology is an enviable catalyst for national development, because of its cosmopolitan applications. It can be deployed to solve myriads of problems that confront us as a nation- environmental degradation, lack of clean water, energy crisis, food insecurity, physical insecurity, infrastructural deficit and burden of diseases among others. Creatively, nanotechnology exploits lead to innovation and development of new processes and products, with great impacts on job creation and stimulation of economy. Thus, Nigeria must act fast to imbibe nanotechnology for growth and development.

Once again, I applaud the Director-General of NASRDA and his team for this partnership. It is a step in the right direction, and I do hope that the partnership will wax stronger for us to have more meaningful deliverables in the nearest future. I thank our keynote speaker, guest speaker, other invited speakers, guests and participants for honouring us with your presence. I also congratulate NANO+, for this milestone, and state that the University is proud of your activities on nanotechnology. I invite your group to make use of the new opportunity in the University through the recently established Intellectual Property and Technology Transfer Office (IPPTO) to register and protect your innovations, and enhance their commercialization.

I thank you and I wish you a rewarding conference.

**SPEECH DELIVERED BY THE HONOURABLE MINISTER OF
SCIENCE, TECHNOLOGY AND INNOVATION, SENATOR ADELEKE
MAMORA AT THE OPENING CEREMONY OF 6th INTERNATIONAL
CONFERENCE ON NANOTECHNOLOGY ORGANIZED BY THE
NANOTECHNOLOGY RESEARCH GROUP (*NANO^r*) OF LADOKE
AKINTOLA UNIVERSITY OF TECHNOLOGY (LAUTECH),
OGBOMOSO IN COLLABORATION WITH NATIONAL SPACE
RESEARCH AND DEVELOPMENT AGENCY (NASRDA) HELD ON
NOVEMBER 22-25, 2022**

Protocols

1. On behalf of the Federal Ministry of Science, Technology and Innovation (FMSTI), I welcome you to the 6th international conference on Nanotechnology which is jointly organized by the Nanotechnology Research Group (*NANO^r*) of Ladoke Akintola University of Technology, Ogbomoso and an agency of the Ministry, the National Space Research and Development Agency (NASRDA) in collaboration with Chemical Technology Department, Federal Ministry of Science, Technology and innovation holding here in Abuja.
2. May I seize this opportunity to commend the effort of the organizers for fostering a partnership to bring to the front burner, discussions about one of the greatest scientific endeavours of the 21st century that is poised to change the dynamics of events in the world like never before.
3. Though the science and applications of materials at nanoscale is not new to mankind, the advances of Nanotechnology in the last two decades have been tremendous and exciting; in terms of its impact in manufacturing of new wide range of goods with immense capabilities, rendering of services, efficient resource utilization, job security and economic prosperity, thereby catalyzing the 4th industrialization revolution
4. At the moment, nano-based products are worth more than \$3 trillion and supporting over 6 million jobs globally. It is projected that by 2030, about 10% of world's GDP will revolve around Nanotechnology enterprises. It is indeed the new order of value addition and wealth, which is largely driven by knowledge-based activities and not just

natural resources. Therefore, the theme of the conference, **'Nanotechnology for Socio-Economic Development of Africa'** is appropriate as African nations should look beyond natural mineral resources to advance growth and development on the continent.

5. Distinguished Ladies and Gentlemen, with the current economic challenges facing the nation, Nanotechnology is one of the rescue cards that Nigeria should explore. It was in line with this, that Federal Ministry of Science and Technology through the Chemical technology department in 2018 raised the National Steering Committee on Nanotechnology development to develop a policy for Nanotechnology R&D in Nigeria. We are devoting our resources to ensure speedy consideration of the draft policy that has been submitted to the Cabinet Office for Federal Executive Council (FEC) consideration and approval.
6. Undoubtedly, Nigerian scholars within and outside the country have made major contributions to Nanotechnology R&D, which ranks the country among the top 5 African countries in this multidisciplinary field. I therefore salute the courage of the LAUTECH Nanotechnology Research Group for extending the frontiers of Nanotechnology R&D in Nigeria. I am impressed with the quality of research outputs by the group that has earned them commendation by the University. Notably, the organization of annual workshops and conferences in this area since 2017, the establishment of a specialized journal on Nanotechnology, **'Nano Plus: Science and Technology of Nanomaterials'**- the first in sub-Saharan Africa, which was launched by Honourable Minister of Science and Technology in 2020, and the dissemination of comprehensible news items on Nanotechnology are worthy of commendation.
7. I am therefore pleased that one of our prime agencies, NASRDA decided to partner with the research group to advance Nanotechnology R&D in Nigeria. I must thank the leadership of these entities, Professor Agbaje Lateef, the DCT-M.E.J. Bassey and Dr. Halilu A. Shaba for seeing this through. I do hope that you will explore this mutual relationship further, with the continuous collaborative support of my Ministry. I also congratulate the University for strengthening the research group in her activities. Doing so has added more value to the University with greater opportunities that lie ahead.

8. I am aware of the request of the research group to address challenges that it faces in having access to state-of-the-art analytical equipment and the establishment of centre of excellence in Nanotechnology. The group has without any reservation demonstrated excellent capability in pursuance of hi-tech research in Nanotechnology and the Ministry will see to this request. The University is encouraged to earnestly make available research buildings for the research group, for the mobilization of effort towards the realization of equipping the Centre; with support from other agencies of Government and the private sector.
9. With the expanding opportunities that Nanotechnology offers in Economic sectors like agriculture, health, environment, renewable energy, consumer products, ICT, advanced engineering, defence and security in line with the SDGs, I have no doubt that this conference will herald more benefits of Nanotechnology initiatives for National Development and sustainability.
10. **Distinguished Guests and Participants, thank you and I wish you happy and successful deliberation.**

God Bless the Federal Republic of Nigeria

**The Honourable Minister
Federal Ministry of Science, Technology and Innovation**