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News 21 November 2022

TWAS elects 50 new Fellows

Forty per cent of the newly elected TWAS Fellows are women scientists. And 6 new Fellows are from science- and technology-lagging countries, two of which are also underrepresented in TWAS membership.

On Monday, 21 November, during its [General Meeting](#), TWAS elected 50 new Fellows. Twenty new members are women, representing 40 per cent of the new class.

Six new members are from science- and technology-lagging countries: two from Bangladesh, and one each from Ethiopia, Kenya, Mali, and Nepal. The latter two countries are also underrepresented in TWAS membership.

Four new members hail from other underrepresented countries at TWAS: one each from Algeria, Peru, Qatar, and Trinidad and Tobago.

The other 40 new Fellows are from Brazil (8); China (9); Taiwan, China (1); Cuba (1); Egypt (1); India (7); the Islamic Republic of Iran (2); Malaysia (2), Mexico (1); Pakistan (2); Philippines (2); South Africa (1); and the United States of America (3).

The election of the new Fellows will be effective starting on 1 January 2023, bringing the total TWAS membership to 1,384.

01-Agricultural Sciences

ASSEM, Shireen Kamal Assem Abd El-Halim (Egypt), (F). Professor, Biotechnology and Genetic Engineering Research Institute; Vice-President, Agricultural Research Center, Egypt. The nominee has contributed significantly towards the development of genetic transformation systems in major cereal crops for biotic and abiotic stresses tolerance. Member (later Vice-President) of the national Committee of Genetic Sciences that works under the umbrella of the

Academy of Scientific Research and Technology (ASRT), she received Fulbright Postdoctoral Fellowship at the University of Central Florida, USA, and the FAO Prize 2017.

IDERIS, Aini (Malaysia), (F). Pro-Chancellor, International Medical University Malaysia, Kuala Lumpur, Malaysia. The nominee pioneered animal vaccines development in Malaysia and has outstanding contributions in poultry health nationally and internationally. She plays an instrumental role in advancing efforts towards food security and sustainable food production in the developing countries, via successful cloning, development and commercialisation of four important poultry vaccines, namely, heat stable Newcastle disease (V4UPM) vaccine, fowl pox vaccine (Principal Researcher), and live and inactivated infectious bursal disease vaccines (Co-Researcher). Newcastle disease is a devastating disease which can kill 100 per cent of chickens if they are not vaccinated. These locally produced vaccines are cheaper than imported vaccines. They have successfully been registered and sold in almost 20 developing countries, as well as undergoing registration in more countries. Her research output has led to the establishment of the first and the only animal vaccines company in Malaysia, equipped with Good Manufacturing Practices facilities. Member of the Academy of Sciences Malaysia, she has received the Excellence Community Leader Award, CHT Pursuit of Excellence Education Award, Millennium Academic Achievement Award, Women Icon Worker Award, among others.

JAYARAMAN, Jayaraj (Trinidad and Tobago), (M). Professor, The University of the West Indies (UWI), Trinidad and Tobago. The nominee developed novel antibiotic adjuvants to treat antibiotic resistant bacterial pathogens; developed novel phytoelicitor formulations from *Sargassum* and demonstrated their phytoelicitor activity. He identified the mechanisms of induced resistance by bioelicitors, developed organic farming methods for field and greenhouse crops to cut down chemical usage, developed Integrated disease management methods for vegetable crops, and disseminated and delivered the technology to the Caribbean region. Furthermore, he demonstrated the biosynthesis of ketocarotenoids in carrot roots through metabolic engineering for application in nutraceutical and fish feed industry; developed plant-based expression platforms for expressing therapeutic proteins; generated pest and disease resistant transgenic crop plants; developed several high-efficient fungal and bacterial biocontrol agents and demonstrated their field efficacy for environmental-sensitive farming; and developed molecular-based disease diagnostic techniques for plants. Member of the Caribbean Academy of Sciences, he has received The UWI Vice-Chancellor's Excellence Award for Research Accomplishments and the Accreditation Council of Trinidad and Tobago Award for excellence in education and research, Government of Trinidad and Tobago, among others.

MAZZAFERA, Paulo (Brazil), (M). Full Professor, State University of Campinas (Unicamp), Department of Plant Biology, Campinas SP, Brazil. The nominee found a naturally decaffeinated coffee, published in *Nature* and highlighted in the same journal (<https://www.nature.com/articles/483264a>). He published the first draft of the lignin biosynthesis and the gene toolbox in sugarcane. He showed that the toolbox was conserved in 4 sugarcane species and that lignin in sugarcane is under transcriptional control. He showed that coffee intercropped with *Brachiaria* increases productivity due to changes in water and organic matter of the soil. He showed the importance of mycorrhiza in protecting coffee against pollutant heavy metals and its importance to P nutrition. He showed that the genetic background could separate *Eucalyptus* species in efficiency or responsiveness to soil-P content, a major

problem in agriculture. He showed how climate changes (CO₂ and temperature) can affect *Eucalyptus* cell wall polymers. Member of the Brazilian Academy of Science and São Paulo Academy of Science, he has received the Award from the Brazilian Coffee Industry Association and the Zeferino Vaz Academic Recognition Award from Unicamp, among others.

YANG, Weicai (China), (M). Principal Investigator and Full Professor, Director, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China. The nominee has long been devoting his researches to molecular mechanisms governing plant reproductive development using Arabidopsis model system, and has obtained a series of outstanding achievements. His pioneering works include the discovery of sporocyteless controlling the *de novo* formation of germline cells (*Genes and Development*, 1999), pollen tube receptor complex MDIS-MIK for recognition of female cue LURE1 (*Nature*, 2016), MLO (*Nature Plants*, 2020) and TOD1 (*Nature Communications*, 2015) controlling pollen tube growth and guidance, the CCG-CBP1-AGL80 transcription complex controlling central cell fate and pollen tube attraction (*Plant Cell*, 2007, 2015; *PNAS*, 2018), etc. His seminal contributions have advanced our understanding of molecular mechanisms underlying plant sexual reproduction. Yang is a leading scientist in the field of plant development. Member of the Chinese Academy of Sciences, he has received the National Science Fund for Distinguished Young Scholars, National Natural Science Award (the second prize) and the 2016 Top 10 Scientific Advances in Life Sciences of China, among others.

02-Structural, Cell and Molecular Biology

LI, Jinsong (China), (M). Professor and Director, State Key Laboratory of Cell Biology, Shanghai Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences (CAS), Shanghai, China. The nominee's lab focuses on stem cells and embryonic development, and he has made fundamental contributions through his work in mice to the establishment of androgenetic haploid embryonic stem cells that can be used as sperm replacement to efficiently generate semi-cloned (SC) mice upon injection into MII oocytes. Li has shown that this technology can be used as a unique tool for genetic analyses in mice, including medium-scale targeted screening of crucial genes or essential nucleotides of a specific gene involved in a developmental process; screening for human developmental defect-related mutations; and one-step generation of mouse models that mimic multiple genetic defects in human diseases. Recently, with this technology, Li initiated a major genome tagging project to tag every protein in mice, which may enable the precise description of protein expression and localization patterns, and protein-protein, protein-DNA, and protein-RNA interactions at organismal level. Member of the CAS, he has received the Shanghai National Natural Science Award, Guanghua Engineering Science and Technology Prize (Youth Prize) and the Ho Leung Ho Lee Foundation award for Scientific and Technological Progress in life Science (Youth Innovation Prize), among others.

PANT, Bijaya (Nepal), (F). Professor, Central Department of Botany, Tribhuvan University, Nepal. The nominee is one of the very few Nepali scientists who has been passionately engaged for more than two decades in developing plant tissue culture technology and made groundbreaking contributions primarily on endangered and economically important species of medicinal plants and orchids of Nepal. She has greatly contributed in investigating the anticancer properties of orchids and various beneficial roles of the entophytes in them, conservation of their

germplasm, promote their commercial utilization, and transfer them from lab to land. She has spread the awareness on medicinal value of Nepalese orchids and their conservation needs, as they have reached to threatened category due to illegal trade and overexploitation. She works with communities for native orchid conservation and sustainable utilization. Member of the Nepal Academy of Science and Technology, she has received the Nabil Science and Technology Award, Dipendra Young Scientist Award, among others.

RANGAPPA, Kanchugarakoppal (India), (M). CSIR emeritus scientist and Distinguished Professor at the University of Mysore, India. The nominee has developed more than 7,000 synthetic small molecules from his laboratory and some of them have been demonstrated as exemplary compounds towards cancer with good growth inhibitory activity in preclinical cancer models. The chemical entities developed in his laboratory are being used as scaffolds in the world premier institutions for the development of drugs against various human ailments. Recently, two of his compounds namely DMBO and NPB have entered the market as standard inhibitors of growth factors and BAD protein respectively. DMBO and NPB compounds are being sold by American companies as standard inhibitors of pharmacologically important proteins. Similarly, he has discovered many pharmacological inhibitors of STAT3, NF- κ B, TFF3, human methionyl-tRNA synthetases which are constitutively expressed in various human cancers. Recently, he developed a COVID-19 self-detection kit and submitted it to ICMR for approval and public use. Member of The National Academy of Sciences, India, he has received Prof. R.C. Shah Memorial National Award, Sir C.V. Raman Young Scientist Award, Dr. Raja Ramanna Award and Centenary gold medal by Honourable President of India, among others.

VAN SLUYS, Marie-Anne (Brazil), (F). Full Professor, Department of Botany, Universidade de São Paulo, Brazil. After her PhD in France, the nominee returned to Brazil to set up the first research group in plant biotechnology and molecular biology at the University of São Paulo (USP). She mentored 75 young researchers from undergraduate to postdoctoral researchers, all of which are working in different sectors of both fields in Brazil. Her expertise in plant-microbe interaction granted her the opportunity to lead one of the groups that described the first plant pathogen genome; and furthermore she was invited by the Agricultural Research Service, United States Department of Agriculture, to lead the initiative to sequence the genome of the grapevine Pierce's disease causal agent. She joined the USA National Research Council Committee to review California's Agricultural Research Priorities. Her work improved the understanding of lateral gene transfer of plant associated bacteria. Most recently, she acted to structure an international consortium to sequence the sugarcane genome for plant biotechnology and molecular breeding already released for improving sustainable bioenergy. Member of the Brazilian Academy of Sciences, she is also a member of the Brazilian Society of Genetics; the British Society of Plant Pathology; the American Association for the Advancement of Science and the Sociedade Brasileira para o Progresso da Ciência.

03-Biological Systems and Organisms

BEYENE, Yonas (Ethiopia), (M). Prehistoric Archaeologist, French Center for Ethiopian Studies, Addis Ababa, Ethiopia. The nominee's endeavour in paleoanthropological research in Ethiopia has greatly contributed to the understanding of the early human cultural and biological history. He discovered and published the world's earliest Acheulean technologies. Beyene with his team discovered many new paleoanthropological areas in Ethiopia. He is

chief archaeologist for the Middle Awash Research project in the Afar Region of Ethiopia. His work at Chorora site resulted in the discovery of 8 million years old ape species called *Chororapithecus abysinicus*, which may be the root species that gave rise to the present day Gorillas. He managed the Department of Archaeology and Paleontology at the then Ministry of Culture and Tourism of Ethiopia for more than 20 years. He also lectured at the Addis Ababa University and advised graduate program students. In 1996 he taught African Prehistory at Muséum national d'Histoire naturelle and the Institut de Paléontologie Humaine in Paris, France. Member of the Ethiopian Academy of Sciences, he received from the Prince Albert I of Monaco Award for research and the Medallion of *Palmes académique* from the French Ministry of Education and Research for merit in scientific research, among others.

MOMBA, Maggy Ndombo Benteke (South Africa), (F). Full Research Professor and South African National Chair Holder for Water Quality and Wastewater management, Tshwane University of Technology, South Africa. The nominee has excelled in initiating, designing, constructing/improving and evaluating cost-effective decentralized technologies for the production of safe drinking water and management of wastewater in developing countries. She developed a computer-implemented genome tracking method and system to contain and track antibiotic-resistant bacteria and genes of environmental isolates to prevent them from reaching clinics and healthcare settings. Academically, she has displayed a high level of commitment, supported by many national and international collaborations. She is a Visiting Professor at the University of Paris-Est Creteil, France, Professor at the University of Mbandaka, the Democratic Republic of the Congo, and member of WHO Advisory Committee, Switzerland, for evaluation scheme of Household Water Treatment Technologies. She holds 10 memberships in national and international scientific committees related to the water sector. Capacity building and technology transfer have been at the centre of all her activities nationally, regionally and globally.

PANDEY, Ashok (India), (M). Distinguished Scientist, CSIR-Indian Institute of Toxicology Research, Lucknow, India. The nominee is a world authority on bioprocess technology, especially on industrial enzymes and biofuels—a programme on alternative fuels started by him in CSIR over 15 years ago for energy and environmental sustainability. He created a niche for bioprocess technology research and development in India for production of industrially important products on the principles of waste to wealth. On five keywords of his works (bioconversion of biomass, industrial fermentation, solid-state fermentation, industrial enzymes, lignocellulosic bioethanol), his name appears as top researcher in the world in a number of SCI journal papers. Pandey has around 1,600 publications/communications, including 16 patents, 108 books, around 850 original/review papers, book chapters, etc with an h-index of 116 and over 58,500 citations. In the Elsevier Citation Report (2021) he is ranked at the first place in microbiology in India; in Stanford University world ranking (2021) he is ranked at the first place in India in biotechnology; and is among the Highly Cited Researchers identified by Clarivate. Member of the National Academy of Sciences, India, he has received the Life-Time Achievement Award by the International Society for Solid Waste Management; and the Life-Time Achievement Award by the Biotech Research Society, India, among others.

PRIMAVERA, Jurgenne Honculada (Philippines), (F). Chief Mangrove Scientific Advisor, Zoological Society of London (Philippine Field Office), Iloilo City, Philippines. The nominee's early research focused on shrimp aquaculture then shifted to mangrove-friendly aquaculture for which she was conferred a PhD in science honoris causa by Stockholm

University. Over almost six decades, Primavera raised the profile of aquaculture, mangroves, beach forests, etc. in over 150 scientific papers, reviews, manuals, books, and other publications (including three papers in *Science* and one in *Nature*). She focuses on rehabilitation of greenbelts, mangrove reversion of abandoned fishponds for coastal protection, food resources and livelihood income. She developed instructional mangrove materials for students in collaboration with education specialists. Member of the National Academy of Science and Technology, Philippine, she was one of the awardees of *Time* magazine's Heroes of the Environment (2008).

SHINWARI, Zabta Khan (Pakistan), (M). Professor Emeritus, Quaid-i-Azam University, Islamabad, Pakistan. The nominee's initial focus was conserving biodiversity using participatory approach. Introduced bioethics, biosecurity and dual use education. He received the Distinguished Scientist Award by the Chinese Academy of Sciences, 2019-2020. He was Vice-Chancellor of Kohat University of Science & Technology (KUST); of University of Science & Technology, Bannu; and of Qarshi University, Lahore, India. He supervised 100 graduate students including PhD. Shinwari presented about 350 articles at international fora. He won 23 competitive grants, is a member of 60 national and international bodies, and served as the Secretary General of Pakistan Academy of Sciences. He is a member and former Vice-Chair of COMEST-UNESCO and gave speeches in UN bodies about international obligations of scientists like the Biological Weapons Convention, the UN Security Council Resolution 1540. Has published 450 articles, 6 books, 3 patents, has 15000 citations, and is editor of *Proceedings of International Conferences*. Member of the Pakistan Academy of Sciences and of the Islamic World Academy of Sciences, he has received various national and international awards, Best University Teacher Award, civil awards (*Tamgha-i-Imtiaz* and *Sitara-e-Imtiaz*), and UNESCO Avicenna Gold Medal for Ethics in Science.

04-Medical and Health Sciences incl. Neurosciences

BOZZA, Patricia T. (Brazil), (F). Senior Investigator; Head of Laboratory of Immunopharmacology, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz (FIOCRUZ), Rio de Janeiro, Brazil. The nominee has made significant contributions to our understanding of thromboinflammatory mechanisms associated to disease severity in viral and bacterial infections and to immunometabolic pathways in host response to infections. Bozza is Senior Scholar of the Brazilian National Research Council (1A CNPq), and Member of the Brazilian Academy of Science since 2013. Her work has been recognized through national and international awards including the programme Laboratories of Excellence from the Brazilian Ministry of Science and Technology, Distinguish Scientist of the State of Rio de Janeiro (FAPERJ, Rio de Janeiro, Brazil), International Scholar from the Howard Hughes Medical Institute, Fellow of the John Simon Guggenheim Memorial Foundation, and the SCOPUS-Brazil award.

DIKSHIT, Madhu (India), (F). J.C. Bose National Fellow, Central Drug Research Institute (CDRI), Council of Scientific and Industrial Research (CSIR), Lucknow, India. The nominee, a leading Molecular Pharmacologist, has made seminal contributions and impacted the area of neutrophil biology. She used multipronged approaches to understand how nitric oxide (NO) and nitric oxide synthase (NOS) modulate neutrophil differentiation, survival, free radical generation, neutrophil extracellular trap (NETs) formation, chemotaxis, and microbicidal activity. Her systematic studies established importance of inducible NOS and its interaction with Rac2 in the neutrophil phagosomes to mediate pathogen killing. She also recognized role of NO/NOS in myeloid leukemic cell survival, and

demonstrated that augmentation in NO availability overcomes the imatinib resistance. Besides, NO, lactate and oxidized LDL were discovered by her as new mediators of NETosis. She also led the new drug discovery programme on anti-thrombotic drugs at CDRI, one of the molecules has received permission by Drugs Controller General of India to conduct phase I clinical trial, and the technology has been recently transferred. Member of the three Indian science academies, she has received the Vigyan Ratna of the Council of Science and Technology Uttar Pradesh; National Bioscience Award, Department of Biotechnology (DBT), India; Professor K.P. Bhargava Memorial Medal; and Shakuntala Amir Chand Prize, among others.

GAMBOA VILELA, Dionicia Baziliza (Peru), (F). Associate Professor and Principal Investigator, Universidad Peruana Cayetano Heredia, Peru. The major contribution of the nominee and her group was the report of *P. falciparum* parasites lacking pfrp2 gene from the Amazon region, an important marker used by most of the rapid diagnostic tests. Member of the National Academy of Science of Peru, she has received the L'Oréal- UNESCO Fellowship for Young Women in Science, the L'Oréal-UNESCO Award for Women in Science for Peru, the OWSD-Elsevier Foundation Award for Early Career Women Scientists in the Developing World, among others.

HUNG, Mien-Chie (Taiwan, China), (M). President, China Medical University, Taiwan, China. The nominee has been instrumental in unravelling traditional and non-canonical signalling pathways, his landmark discoveries have led to paradigm-shift concept of receptor tyrosine kinase biology that significantly impacts cancer medicine—predicting drug resistance, stratifying patients for targeted therapy and developing effective cancer treatments. Most impressively, Hung's group has made substantial contribution in the last three years to improve therapeutic efficacy of PD-1/PD-L1 immune checkpoint therapy as well as to develop an innovative method to accurately identify patients, who were otherwise diagnosed as negative (false negative) for receiving immunotherapy. Member of the Academia Sinica, he has received the LeMaistre Outstanding Achievement Award, among others.

KABIR, Yearul (Bangladesh), (M). Professor and Chairman, Department of Biochemistry and Molecular Biology, University of Dhaka, Bangladesh. The nominee's work on the mushroom for the first time reported that dietary mushrooms (shiitake and maitake) prevent blood pressure increase in hypertension. Further, maitake also reduces the blood pressure in hypertension. Using radioactive ¹⁴C-octacosanol for the first time, he scientifically supported the hypothesis that motor endurance and physical performance are increased by octacosanol and suggested a mechanism. Besides, he showed that octacosanol possesses an adipokinetic activity. He showed a high prevalence of subclinical vitamin A deficiency among adolescent female garment workers in Bangladesh. He recently started working with cancer and, for the first time, reported a significant association between p53 Pro72 genotype and risk of developing bladder cancer in the Bangladeshi population. Further, he reported that N-acetyltransferase 2 (NAT2) slow genotype is a significant genetic determinant for bladder cancer in Bangladesh population. Member of the Bangladesh Academy of Sciences, he has received the Dean's Teacher Research Award (Gold Medal) of the Faculty of Biological Sciences, University of Dhaka; and the Japanese Government Scholarship for PhD at Tohoku University, 1987–1990.

OSIER, Faith Hope Among'in (Kenya), (F). Group Leader, KEMRI-Wellcome Trust Research Programme, Kenya. The nominee's major scientific accomplishments have been in malaria immunology. In highly cited studies, she

demonstrated that the breadth and magnitude of the antibody response against specific merozoite-stage antigens was a strong predictor of protection against clinical episodes of malaria and that potentially many more antigens contributed to protection than had been previously considered. She developed the first African custom protein microarray for *falciparum*. She brought together a consortium SMART (South-South Malaria Antigen Research Partnership, <https://www.smartpartnership.net/>) that brings together African and international scientists to share resources to facilitate malaria vaccine development. She has developed antibody-dependent functional assays against merozoite-stage parasites. She has used malaria challenge studies to provide an elegant contemporary demonstration of the protective role of antibodies in acquired immunity. Member of the African Academy of Sciences, she has received the Sofja Kovalevskaja Award and the Royal Society Pfizer Award, among others.

OVBIAGELE, Bruce (USA), (M). Professor of Neurology and Associate Dean, University of California, San Francisco, USA (primary), and University of Ibadan, Nigeria. The nominee has published more than 520 scientific articles. He led several multisite stroke studies in Africa, including the largest epidemiological investigation of stroke in sub-Saharan Africa, which for the first time, characterized key features of stroke in the region, as well as the first implementation science studies, which indicated that nurse-guided m-Health (mobile health) technology may contribute to better blood pressure control after stroke. He received the 2008 American Academy of Neurology Pessin Research Leadership Award. He chaired the International Stroke Conference (2016–2018), was Founding Editor-in-Chief of a World Federation of Neurology scientific journal (2014–2019) and is an elected Fellow of US National Academy of Medicine (2021), African Academy of Sciences, Nigerian Academy of Science. He is founding chair of the inaugural African Stroke Organization Conference (2021).

QIAO, Jie (China), (F). Director, Peking University Health Science Centre, President of Peking University Third Hospital, Beijing, China. The nominee has a high reputation in the field of reproductive medicine in China and worldwide. For more than 30 years, she has endeavoured to unravel the profound mystery of human reproduction, and achieved a number of theoretical and technical breakthroughs in the systematic study of gametogenesis and embryo development, infertility causes and clinical treatments, the protection and preservation of female fertility as well as developing a series of new pre-implantation diagnosis (PGT) methods, which greatly reduce the cost and improve the efficiency of inherited diseases. Member of Chinese Academy of Engineering, American Academy of Arts and Sciences, and Royal College of Obstetricians and Gynaecologists, she has received the Top Ten Progress of Chinese Science, the National Award for Progress in Science and Technology twice, and won the C3 China-US Healthcare Summit award for Outstanding Woman's Achievement.

SANOGO, Rokia (Mali), (F). Teacher, Researcher in pharmacognosy, Head of Traditional Medicine Department, National Institute for Public Health, Université des Sciences, des Techniques et des Technologies de Bamako (USTTB), Mali. The nominee's research is in phyto-chemical, pharmacological and toxicological evaluation data and the formulation of phytomedicines, constitution of marketing authorization files for improved traditional medicines which are safe, effective and of quality, and registered on the list of Essential Medicines in Mali, contributing to the treatment of frequent pathologies. The West African Pharmacopoeia has led to the development of new anti-malarial, hepatoprotective and anti-diabetic phytomedicines. New molecules from medicinal plants used for the

treatment of priority and/or neglected diseases and for the treatment of cancer. As a teacher and researcher in pharmacognosy, she has contributed to the training and promotion of science in Africa through the development of the pharmaceutical sector. Member of the Académie des Sciences du Mali, she has received the *Prix Scientifique Kwame Nkrumah*, among others.

WASAY, Mohammad (Pakistan), (M). Professor of Neurology, Department of Medicine, Aga Khan University, Pakistan. The nominee trained in neurology in some of the top Institutes of Neurology in the United States but in his mid-career he made a conscious effort to return to Pakistan for the wider benefit of his community in a meaningful manner. He not only excelled in research but translated that research at the National and International level for better diagnosis and management of neurological diseases. He is considered a world expert in the area of cerebral venous thrombosis (CVT) and central nervous system (CNS) tuberculosis related strokes which is extremely important in TB endemic areas in the region. He is also an outstanding advocacy leader and is changing guidelines and policies for disease management at the national and international level. Member of the Pakistan Academy of Sciences, he received Research Productivity Award from Pakistan Council for Science and Technology (twice), among others.

05-Chemical Sciences

CORDOBA DE TORRESI, Susana Ines (Brazil), (F). The nominee is recognized by the international communities of electrochemistry and materials science for contributions to the spectroelectrochemical characterization of conductive polymers and transition metal oxides, the study of the structure-size-geometry-reactivity relationship of electroactive nanomaterials. Research on electrochromism, chemical sensors and more recently, electrocatalysis enhanced by plasmonics are her main interest. She received the Tajima Prize for young researchers from The International Society of Electrochemistry, the National Order of Scientific Merit, Commander category, from the Presidency of the Republic, Brazil. She also received the American Chemical Society (ACS) Award for Brazilian Women in Chemistry, Scientific Leadership category and is 1A CNPq fellow of Brazilian National Research Council, member of the Brazilian Academy of Sciences and the Academy of Sciences of the State of São Paulo. At the present, she is the Vice-Research Provost of São Paulo University.

GUO, Zijian (China), (M). Professor, State Key Laboratory of Coordination Chemistry, Nanjing University, China. As a leading scientist in coordination chemistry, particularly in bioinorganic chemistry, the nominee has made major contributions in bioinorganic sensing and metal-based anticancer agents. He developed a series of fluorescent sensors to reveal the intracellular distribution and metabolism of essential metals. He also explored the potential for rational design of non-classic platinum-based complexes and smart delivery of clinical drugs. Member of the Chinese Academy of Sciences, he is the recipient of the latest "Outstanding Achievement Award" of the Asian Society of Biological Inorganic Chemistry, among others.

MUKHERJEE, Partha Sarathi (India), (M). Professor, Inorganic and Physical Chemistry Department, Indian Institute of Science, India. The nominee has achieved inorganic chemistry leadership and helped the discipline to address a new and very exciting set of challenges. He has generated new ideas and tested novel concepts. He has established

a highly innovative research programme in his laboratory, aiming to address longstanding fundamental challenges posed by coordination-driven self-assembly of giant discrete metallosupramolecules with increasing complexity and stability as well as desirable functions. Self-selection and self-recognition, that are hallmarks of biological self-assembly, have been thoroughly studied by his research group in abiological systems. He has also shown how entities within multicomponent systems interact and influence each other; specifically, on how the outcome of these processes can be altered by external stimuli, such as temperature, concentration, etc. Member of the Indian Academy of Sciences, and Fellow, Royal Society of Chemistry (UK), he has received S. S. Bhatnagar Prize in Chemical Science, SCOPUS Young Scientist award, Indian National Science Academy Young Scientist Medal, among others.

06-Engineering Sciences

BELLOT NORONHA, Fabio (Brazil), (M). Senior Researcher and Professor, National Institute of Technology, Rio de Janeiro, Brazil. The nominee has been involved on the development of stable catalysts for the reforming of biogas and ethanol for the production of hydrogen for fuel cells. Different approaches have been investigated such as the use of redox supports as well as bimetallic catalysts. All of these studies culminated in the publication of a review on the production of hydrogen from ethanol in the *Chemical Reviews* journal. The nominee was also interested in the catalytic upgrading of biomass pyrolysis vapours for the production of fuels from lignocellulosic biomass as an alternative to petroleum oil. He studied the development of appropriated catalysts for hydrodeoxygenation of model compounds, which involved the understanding of the reaction mechanism. Member of the Brazilian Academy of Sciences, he has received the V Prize CREA-RJ (Conselho Regional de Engenharia e Agronomia do Rio de Janeiro) of Scientific and Technological Works, CREA-RJ Prize Inventor of Petrobras, and Young Scientist of the State of Rio de Janeiro, Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro, among others.

DJEFFAL, Fayçal (Algeria), (M). Professor, University of Batna, Algeria. The nominee's work on microelectronic devices and Artificial Intelligence (AI) has gained substantial research acclaim in the field of electronic device modelling and fabrication, specifically in the area of development of new high-performance and low cost microelectronic devices for renewable energy and environmental sensing applications, as evidenced by the number of citations for his published papers in a short span of time. In the context of microelectronic devices for renewable energy and environmental sensing applications, Djeffal has successfully developed new approaches and design techniques of microelectronic devices using soft-computing and AI-based methods. These approaches are now widely used by several scientific laboratories. He has published more than 200 journal articles and conference papers and is the author of some books and book-chapters in the field of photovoltaic devices/environmental sensors and soft-computing. Member of the African Academy of Sciences, he has received the Abdul Hameed Shoman Award for Arab Researchers, among others.

FOTUHI-FIRUZABAD, Mahmud (the Islamic Republic of Iran), (M). Professor of Electrical Engineering, Sharif University of Technology, Tehran, the Islamic Republic of Iran. The nominee is a distinguished professional in power systems reliability community with impressive achievements, and long-lasting contributions. His research enhances the ways in which we think, design, plan, operate, and control the smart electricity grids and the energy infrastructure more efficiently, reliably, and resiliently. His contributions have and will continue to cope with several

existing challenges around decisions for safeguarding the operation of the power grids when facing serious disruptions as well as extremes. His contributions to power system reliability evaluation has created considerable interest and enthusiasm among the electric power industry personnel. He has pioneered the application of probabilistic techniques to investigate and solve a number of serious problems in power grid systems. He is a Fellow of IEEE for his contribution to the application of probabilistic techniques in power system reliability assessment. Member of the Iran National Academy of Science, he has received Outstanding researcher Award in the Power Industry, the sixteenth Khwarizmi International Award, Outstanding Inventor Award from World Intellectual Property Organization (WIPO), Gold Medal Recipient, among others.

HUANG, Tingwen (Qatar), (M). PhD, Professor, Texas A&M University at Qatar, Doha, Qatar. The nominee has made fundamental contributions to dynamics of nonlinear systems, neuromorphic computing, intelligent control and smart grid. Member of the European Academy of Sciences and Arts, Academician of the International Academy for Systems and Cybernetic Sciences, Fellow of IEEE and Asia-Pacific Artificial Intelligence Association (AAIA), Highly Cited Researcher named by Clarivate Analytics, Distinguished Lecturer of IEEE Computational Intelligence Society, he was conferred Outstanding Achievement Award by Asia Pacific Neural Networks Society, Changjiang Chair Professorship by Chinese Ministry of Education, Best Research Project Award by Qatar National Research Fund, The Association of Former Students Distinguished Achievement Award for Research by Texas A&M University, among others.

RAO, Valipe Ramgopal (India), (M). Professor of Electrical Engineering, Indian Institute of Technology (IIT) Delhi, India. The nominee has made significant contributions to the high-voltage drain extended (DEMOS) devices and their failure mechanisms for System-on-Chip (SoC) applications. Specifically, in a series of publications in IEEE International Electron Devices Meeting, IEEE International Reliability Physics Symposium, IEEE Transactions on Electron Devices, and through a dozen US patents filed jointly with semiconductor industries, he has proposed robust drain extended MOS devices, novel ways of introducing high voltage handling capabilities in FinFET technologies, an IGBT device with plugged-in SCR for robust ESD protection in FinFET technologies and demonstrated a dual gate STI DEMOS with improved mixed-signal and hot-carrier reliability. These technologies are now part of Intel chips. Rao's group has also pioneered development of MEMS sensors for explosive detection. The world's first commercially available explosive trace detector, using a MEMS sensor, has been developed in his group and successfully commercialized by NanoSniff Technologies Pvt. Ltd., a start-up he had co-founded. Member of the three Indian science academies, he has received over 30 awards and honors in India and overseas, including Infosys Prize for 2014, Shanti Swarup Bhatnagar Prize in Engineering Sciences, H.H. Mathur Award for Excellence in Research in Applied Sciences, and Prof. C.N.R. Rao Bangalore INDIA NANO Science Award, among others.

SHAHNAZ, Celia (Bangladesh), (F). Professor, Department of Electrical and Electronic Engineering (EEE), Bangladesh University of Engineering and Technology (BUET), Bangladesh. The nominee has translated challenges into opportunities by designing and conducting impactful research and innovative projects for all, especially women Engineers, Young Professionals collaborating with different technical society chapters for more engagement before and during the pandemic. She has made a significant contribution in developing technology meeting the UN

Sustainable Development Goals, supporting communities for the benefit of humanity. She has published more than 150 international journal/conference papers, and is a recipient of the Canadian Commonwealth Scholarship and Bangladesh Academy of Science Gold Medal for her contribution in Science and Technology.

ZHANG, Yue (China), (M). Professor, Director of Beijing Key Laboratory for Advanced Energy Materials and Technologies, University of Science and Technology, China. The nominee has devoted to low-dimensional semiconductor materials. Aiming at major requirements of advanced energy exploitation and information technology revolution for social development, he has been committed to address key scientific issues towards interface engineering during material synthesis, functionalization and service. The acquired achievements from fundamentals to applications have laid pivotal foundation for boosting breakthroughs of low-dimensional semiconductor materials. He is a member of the Chinese Academy of Sciences, Fellow of the Royal Society of Chemistry, Director of Beijing Key Laboratory for Advanced Energy Materials and Technologies and former Director of State Key Laboratory for Advanced Metals and Materials. As the first contributor, he has won one Second Class National Natural Science Award, 11 provincial and ministerial-level scientific awards and Nanogenerators and Piezotronics Award from International Association of Advanced Materials, among many others.

07-Astronomy, Space and Earth Sciences

ARETXAGA, Itziar (Mexico), (F). Researcher, level C (Investigadora Titular C), Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico. The nominee is a leader in the areas of galaxy formation and evolution, with more than 140 research papers in main Astrophysics journals. Her main scientific objective is to unravel the importance of massive star formation around supermassive black holes and their role in galaxy formation and evolution. She currently leads the Scientific Team of a new imaging camera for the 50m Large Millimeter Telescope Alfonso Serrano, the prime observing facility in Mexico, a binational facility with the USA. Member of the Mexican Academy of Sciences and the current Director of the International Schools for Young Astronomers of the International Astronomical Union, she holds the highest recognition level in the Mexican National Researchers' System.

DE GOUVEIA DAL PINO, Elisabete Maria (Brazil), (F). Full Professor, and Head of the Group of High Energy and Plasma Astrophysics, Universidade de São Paulo, Brazil. The nominee introduced in Brazil high-performance magnetohydrodynamic (MHD) numerical simulations to model astrophysical sources: from solar interior, star formation regions, jets and black holes, to galaxy clusters. She has conducted pioneering studies on MHD turbulence, magnetic reconnection, and cosmic ray acceleration in magnetized systems. She is Brazilian Principal Investigator of the largest gamma-ray observatory in construction, the Cherenkov Telescope Array (CTA), and of the ASTRI Mini-Array—precursor of CTA. Member of the Brazilian Academy of Sciences and of the Brazilian Astronomical Society, she received the Claudia Prize of Woman in Science, the Jabuti Award for best Scientific Book, supervised PhD thesis with honours and awards by CAPES (Brazilian Federal Agency for Support and Evaluation of Graduate Education) and three Best Theses in Astronomy of the Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo, among others.

ELTAHIR, Elfatih (USA), (M). H.M. King Bhumibol Professor of Hydrology and Climate, and Professor of Civil and

Environmental Engineering at Massachusetts Institute of Technology (MIT), USA. He is currently the Director of the MIT-University Mohamed the 6th Polytechnic (UM6P) Research Program with a focus on Sustainable Development in Africa. Nominated for his contribution to improving our understanding of how global climate change may impact society through changes in patterns of water availability, extreme weather, and spread of diseases. Member of the Sudanese National Academy of Sciences (SNAS), he has received Lyons Prize in Surveying, University of Khartoum; Ministry of Irrigation Prize; Merghani Hamza Prize; McLaughlin Award, National University of Ireland, US Presidential Early Career Award for Scientists and Engineers, Kuwait Prize in Applied Sciences, among others.

PIAO, Shilong (China), (M). Cheung Kong Professor, College of Urban and Environmental Sciences, Peking University, Beijing, China. The nominee is one of our era's leading figures in the ecology and climate change research community. His research integrates remote sensing, ground observations, and ecosystem modelling to address important questions on how terrestrial ecosystems respond to climate change across different spatial and temporal scales. Among his many fundamental contributions, is the revelation and quantification of the highly variable ecosystem-climate interactions across space and time. His research has been used to improve the predictive capacity of models for their projections of future climate and carbon cycles, and has been widely cited for informed climate policies for China and the global community. He was one of the Lead Authors of IPCC's 5th and 6th climate change assessment reports. Member of the Chinese Academy of Sciences, he has received the TWAS Prize in Astronomy, Earth and Space Sciences, Xplorer Prize, and China Youth Science and Technology Award, among others.

08-Mathematical Sciences

CABALLERO MOTA, Yaile (Cuba), (F). Director of International Relationships, Universidad de Camagüey, Cuba. The nominee is an outstanding researcher who has had an impressive scientific trajectory from her alma mater, the Camaguey University in the centre-east of the Cuban island. She has expertise in applied artificial intelligence and computational sciences and informatics. Her main accomplishments are related to fuzzy information modelling, systems for programming online judges, the interfaces between operations research and computational intelligence, knowledge-based systems in general. Probably the most remarkable achievements are related to the applications of computational techniques and artificial intelligence in real problems, where her last results have contributed to the scientific battle facing the COVID 19 illness as: acquisition of knowledge about COVID 19 mortality, state of the art of artificial intelligence facing COVID 19 in the world, applied operational research for resources administration related to COVID 19 battle in Cuba. Member of the Cuban Academy of Sciences, she received the Carlos J. Finlay Medal and the TWAS Prize for Young Scientists in Developing Countries awarded by the Cuban Academy of Science.

MOSLEHIAN, Mohammad Sal (the Islamic Republic of Iran), (M). Professor, Department of Pure Mathematics, Ferdowsi University of Mashhad, the Islamic Republic of Iran. The nominee developed orthogonality in Hilbert C^* -modules and has made significant contributions to operator means, and been playing an essential role in operator algebra. Currently, he is the President of Iranian Mathematical Society, and a member of the Academy of Science of Iran. He was a Senior Associate of the Abdus Salam International Centre for Theoretical Physics (ICTP) and received

the Tabatabaei Award. He was selected as a distinguished reviewer by FIZ Karlsruhe - Leibniz Institute for Information Infrastructure, and an outstanding researcher by the Ministry of Science, Iran.

NUSSENZVEIG LOPES, Helena Judith (Brazil), (F). Full Professor (Professor Titular), Universidade Federal do Rio de Janeiro, Institute of Mathematics, Rio de Janeiro, Brazil. The nominee has been at the forefront of research on the rigorous mathematical analysis of incompressible fluid flow models at or near turbulent regimes. Member of the Brazilian Academy of Sciences, she has received the TWAS Award in Mathematics, she was elected Fellow of the American Mathematical Society and of Society for Industrial and Applied Mathematics, she was admitted to the National Order of Scientific Merit, Commander Class, and she was an invited speaker at the 2018 International Congress of Mathematicians.

PRASAD, Dipendra (India), (M). Institute Chair Professor, Indian Institute of Technology, Bombay, India. Beginning with his PhD thesis, the nominee has made many outstanding contributions to the important topic of branching laws, describing the restrictions of automorphic representations to subgroups; this is an important aspect of the Langlands Program. This has culminated in the formulation of the Gross-Prasad-Gan conjectures, a higher analogue of the Gross-Zagier theorem. An elected member of all the Science Academies in India, his awards and recognitions include the TWAS Prize in Mathematics (2020), an invitation to lecture at the International Congress of Mathematicians, the Bhatnagar Award, the election as President of the Commission for Developing Countries of the International Mathematical Union, and the long standing editorship of *Mathematische Zeitschrift*.

YE, Xiangdong (China), (M). Professor, Department of Mathematics, University of Science and Technology of China. The nominee's research work covers many important subjects in the fields of topological dynamics, ergodic theory and applications. Precisely, Ye with his collaborators built a new structure theorem of minimal systems involving nilsystems; made a breakthrough by establishing the pointwise convergence of multiple ergodic averages for an ergodic distal system; and proved that the maximal infinite step pronilfactor of a minimal system is the topological characteristic factor which can be used to solve several long standing questions in dynamical systems and combinatorics. Moreover, Ye with his collaborators made essential contributions to problems related to the Sarnak conjecture, the local entropy theory and the chaotic behaviours of dynamical systems. Due to his excellent work, he won Shiing-Shen Chern prize issued by the Chinese Mathematical Society in 2013, the China State Natural Science Award in 2018. Ye was elected as a member of Chinese Academy of Sciences.

09-Physics

DUAN, Wenhui (China), (M). University Chair Professor, Tsinghua University, China. The nominee has made pioneering contributions to computational condensed-matter physics and materials science, especially in exploring novel physical phenomena in low-dimensional quantum systems and predicting new quantum materials. He proposed the concept of symmetry-dominated quantum transport, the strategy of edge doping and the architecture of all-graphene-based electronics, which have been widely adopted in the community of quantum nano-devices. He also made diverse innovative findings on advanced functional materials (such as ruby pressure scale for ultra-high pressure calibration and room-temperature two-dimensional ferroelectricity) and predicted

various novel quantum materials (type-II Dirac semimetal, Ising superconductivity, intrinsic magnetic topological insulator, high-temperature quantum spin/anomalous Hall insulator, magnetic excitonic insulator, etc). Member of the Chinese Academy of Sciences, he has received the National Natural Science Award (Second-rank); Chi-Sun Yeh Award of Physics, Chinese Physical Society; and the Young Faculty Award, Tsinghua University, among others.

GOMES, Anderson Stevens Leonidas (Brazil), (M). Full Professor, Universidade Federal of Pernambuco (UFPE), Physics Department, Recife, Brazil. The nominee has numerous contributions in the fields of ultrafast nonlinear optics, nonlinear optical characterization techniques, doped-fiber amplifiers, random lasers and random fiber lasers, with seminal contributions to the two last themes. Elected member of the Brazilian Academy of Sciences, has been awarded the National Order of Scientific Merit, Class “Comendador” in the field of Physical Science and the UFPE Medal for his scientific and academic contributions.

NAHAR, Sultana Nurun (USA), (F). Astronomy Professor and Co-Director, The Ohio State University (OSU) STEM Centre, Ohio, USA; Adjunct Professor, Cairo University, Egypt, and Aligarh Muslim University, India. The nominee has made seminal and pioneering contributions in enriching the knowledge of atom-radiation interaction and processes in astrophysical and laboratory plasma. She has established characteristic features of atomic photoionization, developed with A.K. Pradhan the new unified method for precise treatment of total electron-ion recombination, developed algorithm for spectroscopic identification of hundreds to thousands of atomic energy levels computed by the R-matrix method, obtained extensive sets of atomic data for the radiative processes of the complex iron ions needed to solve the solar opacity problem, introduced with her team the approach Resonant Nano Plasma Theranostics using X-ray spectroscopy for bio-medical applications, and is the co-author with Pradhan of the graduate textbook *Atomic Astrophysics and Spectroscopy*, founder of the database NORAD-Atomic-Data. She has trained research to hundreds in developing countries. Fellow (Expatriate) of Bangladesh Academy of Science, she has received the Research Mentor Award at OSU, Golden Dome Shield of Cairo University President, Shield of Taibah University, among others.

SUBRAMANIAM, Ramesh T. (Malaysia), (M). Senior Professor, Department of Physics, Faculty of Science, Universiti Malaya, Kuala Lumpur, Malaysia. The nominee is well known for his outstanding scholastic contribution on solutions for energy storage and harvesting devices for a clean energy and sustainable smart cities of tomorrow. He is ranked number two under the research titled “Polymer Electrolyte” by Scopus and recognized as World's Top 2% Scientists for Career-Long Citation Impact by Stanford University. Fellow of all four important Malaysian science academies and Royal Society of Chemistry, he has received the Pacifichem Young Scholar Award from the American Chemical Society, the Young Scientist Award from the International Union of Pure and Applied Chemistry, the Established Scientist Award by the Royal Society, the Fulbright Fellowship at Princeton University, the Institute of Advanced Studies Distinguished Fellowship Award 2022 from Durham University, the ASEAN - China Scholar award 2022, among many others.

10-Social and Economic Sciences

BERNARDO, Allan B. I. (Philippines), (M). Distinguished University Professor, De La Salle University, Manila,

Philippines. The nominee's research applies to cognitive psychological and sociocultural perspectives on various societal concerns including student learning, well-being of vulnerable groups, socioeconomic inequality, and intergroup relations. His early work modelled how language interacts with different components of mathematical problem-solving, which contributed to the country's mother-tongue-based multilingual-education policy. He developed the locus-of-hope model that applies a cultural lens as alternative to western constructions and measures of hope and well-being. He is one of the pioneers in the study of polyculturalism, the lay theory of culture that has implications of intergroup/intercultural relations. He continues to make significant contributions to study of lay theories and socioeconomic inequality. Member of the National Academy of Science and Technology of the Philippines, he has received the Distinction Award for Psychology (Research and Development), Philippine Federation of Professional Organizations, Outstanding Professional of the Year in Psychology, Achievement Award for Social Science, National Resilience Council Philippines, among others.

CHAKRABORTI, Anirban (India), (M). Professor, Jawaharlal Nehru University, India. The nominee has been performing important and influential interdisciplinary research on the statistical physics of complex socioeconomic systems, termed "econophysics" and "sociophysics". His most influential works are on (i) kinetic exchange models of income, wealth, consumption, opinion, etc.; (ii) socioeconomic networks; and (iii) competitive resource allocation problems, which have received much critical acclaim. He has received the Indian National Science Academy Young Scientist medal, India; travel grant and financial support awarded by the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy, to attend school and workshop at the Interdisciplinary Centre of Theoretical Studies, Beijing, China; and the National Scholarship awarded for studying MSc, India.

YANG, Cuihong (China), (F). Chair Professor, Deputy Director, Academy of Mathematics and Systems Science, CAS, China. The nominee is one of the leading experts in international input-output (IO) field. She has made outstanding contribution in developing new models of input-output techniques, and the applications to strongly support the policy-making of the Chinese government in foreign trade, water conservancy investment, grain security, macro-economic analysis and energy utilization. She is the recipient of TWAS Siwei Cheng Award in Economic Sciences, National Award for Youth in Science and Technology, National Natural Science Fund for Distinguished Young Scholars, Sun Yefang Economic Award (the most reputed award in economics in China), among many others.

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