International Atomic Energy Agency Scientific Forum

ATOMS IN INDUSTRY

Radiation Technology for Development

15–16 September 2015, Vienna, Austria
Boardroom D, C Building, 4th Floor

IAEA
International Atomic Energy Agency
Atoms for Peace

Foreword

Atoms in Industry: Radiation Technology Supports Development

Cutting-edge industrial technologies underpin the success of strong economies, in developed and developing countries alike. Nuclear science and technology, in particular, can make a major contribution to economic growth and competitiveness, and have an important role to play in support of sustainable development. The IAEA helps to make nuclear science and technology available to enable countries to pursue wider development objectives in areas including human health, agriculture, natural resource management and environmental protection. This year's Scientific Forum entitled Atoms in Industry. Radiation Technology for Development highlights some of the ways in which the technology is being put to effective use in industry.

Radiation technologies are part of our everyday lives. Buildings, pipes, medical devices and car parts are just some of the items treated and tested with radiation in a controlled and safe manner during manufacturing. Such procedures increase product quality and safety, benefiting both manufacturers and consumers. Radiation technologies often offer a more environmentally friendly approach than traditional alternatives, requiring less energy and generating less waste.

As their populations grow, low and middle income countries need to find ways to step up their industrial development to boost production and meet consumer demand in sustainable ways. Nuclear technologies can help make these processes more cost effective, as well as safer for the environment, and lead to better products that will ultimately benefit society.

Making radiation technologies available to Member States and assisting them in the peaceful use of these technologies are an important part of the IAEA's work. Through technical cooperation projects, coordinated research activities and scientific meetings, hundreds of scientists and experts from all over the world work together to further improve radiation technologies and make them accessible to industry. In the last few years, this technical cooperation has also stimulated South–South cooperation among developing countries: Malaysia helps Sudan in non-destructive testing techniques, and Viet Nam transfers radiotracer technology to Angola, to name just two examples.

This year's IAEA Scientific Forum showcases some of these technologies and brings together leading experts to discuss the latest trends and best practices, so that Member States can share experiences and learn more about the benefits of these techniques.

Yukiya Amano
IAEA Director General

PROGRAMME

The Scientific Forum will be moderated by **Ms Melinda Crane**, Chief Political Correspondent for Deutsche Welle-TV, and an expert in a range of topics from climate and energy to finance, migration and new media. She has a PhD from the Fletcher School of Law and Diplomacy.

Tuesday, 15 September 2015

10:00–11:00 Introduction/Opening

In the opening session leading experts will give a brief overview of the benefits radiation technology has brought to various industries.

Opening Statement by **Mr Yukiya Amano,** IAEA Director General

Mr Sergey Kirienko, Chief Executive Officer, ROSATOM, RUSSIAN FEDERATION

Mr Ratan Kumar Sinha, Chairman, Atomic Energy Commission; Secretary, Department of Atomic Energy, Government of India, INDIA

Mr Taylor Wilson, Nuclear Physicist, UNITED STATES

11:00–12:00 Session 1: Battling the Bugs

Radiation can kill disease-causing germs and neutralize other harmful organisms, being often used to clean, sterilize and sanitize materials. This session will discuss how nuclear applications and radiation technology benefit human health and improve healthcare.

Mr Josef Mittendorfer, Consultant, High Tech Consulting, AUSTRIA

Ms Celina Ines Horak, Head, Department of Radiation Processing Application, Comisión Nacional de Energía Atómica (CNEA), ARGENTINA

Mr Justin Davies, Leader, Radiation Technology, Australian Nuclear Science and Technology Organization (ANSTO), AUSTRALIA

12:00–13:00 Session 2: Linking the Chains

Radiation processing of polymers such as rubber is cost-effective and allows mass production of high quality products. Once set up, radiation processing techniques can make large-scale production economical and environment-friendly. This session will highlight the wide reach of radiation technologies used for cross-linking processes in materials, which benefit a variety of industries and ultimately consumers.

Ms Yuwei Zhang, Vice President, Wuxi El Pont Radiation Technology Company, CHINA

Mr Wilson Calvo, Administrative and Infrastructure Director, Nuclear and Energy Research Institute, National Nuclear Energy Commission (IPEN), BRAZIL

Mr Masao Tamada, Director General, Takasaki Advanced Radiation Research Institute, Sector of Nuclear Science Research, Japan Atomic Energy Agency (JAEA), JAPAN

13:00–14:30 Lunch break

14:30–15:30 Session 3: Solutions for Pollution

Radiation technologies have been successfully deployed to identify contaminating pathways and treat and neutralize persistent industrial pollutants. This session will focus on nuclear applications for the treatment of waste waters, flue gases and the preservation of coastlines.

Mr Bumsoo Han, CEO and President, EB-Tech. Co., Ltd., REPUBLIC OF KOREA

Mr Andrzej Chmielewski, Director General, Institute of Nuclear Chemistry and Technology (INCT), POLAND

Ms Catherine Hughes, Senior Research Scientist, Isotope Hydrology and Radiotracing, Australian Nuclear Science and Technology Organisation (ANSTO), AUSTRALIA

15:30–16:00 Coffee break

16:00–17:30 Session 4: Tracing the Pathways

Radiotracers and nucleonic gauges play an important role in enhancing productivity and in ensuring quality and reliability of industrial processes and production systems. Such techniques also help to trace pathways of unseen phenomena in nature. This session will discuss how these technologies benefit industries and help to identify the potential negative impact of human activities.

Mr Tor Bjørnstad, Chief Scientist, Institute for Energy Technology (IFE); Professor, University of Oslo, NORWAY

Ms Haifa Ben Abdelouahed, Assistant Professor, Centre National des Sciences et Technologies Nucléaires (CNSTN), TUNISIA

Mr Jean Louis Boutaine, Former Head, Research Department of the Centre for Research and Restoration of the Museums of France, FRANCE

Mr Bernard Malherbe, Director Project Development, Jan De Nul Group, BELGIUM

Mr Martin Jech, Leader, Research Area Friction Surface Phenomena and Tribodiagnistics, AC^{2}T, AUSTRIA

17:30–19:00 Reception and IAEA Exhibition (C04 Coffee Area)

Wednesday, 16 September 2015

09:00–10:00 Session 5: Bolstering Safety and Quality

Safety is of utmost importance in industries. Radiation-based, Non-Destructive Testing (NDT) techniques are indispensable tools for all manufacturing industries and civil engineering activities. NDT helps assess, control and periodically examine the quality of components, machinery and structures, which in turn ensure safety of operation and the protection of human lives. This session will focus on NDT, the key technology to improve and guarantee the quality of industrial goods and services.

Mr Winfried Petry, Scientific Director, Research Reactor Heinz Maier-Leibnitz (FRMII); Professor, Technical University of Munich, GERMANY

Mr Abdul Nassir Bin Ibrahim, President, Malaysian Society for NDT; Managing Director, Madani NDT Training Centre, MALAYSIA

Ms Loveetah Chummun Bhujohory, Acting Head, Engineering Unit, Mauritius Standards Bureau (MSB), MAURITIUS

11:00–11:00 Panel Discussion: Non-Destructive Testing for development, training and qualification of personnel

Mr Mike Farley, Chairman, International Committee for Non-Destructive Testing (ICNDT), UNITED KINGDOM

Mr Sean Blake, Executive Director, Southern African Institute of Welding (SAIW), SOUTH AFRICA

Mr Sigit Budi Santoso, Senior Researcher, Center for Isotopes and Radiation Application, National Nuclear Energy Agency (PAIR-BATAN), INDONESIA

Mr Rachad Alami, Head, Division of Industrial Applications, Centre National de l'Energie des Sciences & des Techniques Nucléaires (CNESTEN), MOROCCO

11:00–11:30 Coffee break

11:30–13:00 Session 6: Rays of Hope

This session will look at a range of new developments and innovative applications of radiation technology, including in the areas of health, food and agriculture, as well as cultural heritage.

Ms Clelia Dispenza, Professor, University of Palermo, ITALY

Mr Khairul Zaman Bin Haji Mohd Dahlan, Technical Director, Polycomposite Sdn Bhd; Former Director, Radiation Processing Technology Division, Malaysian Nuclear Agency, MALAYSIA

Mr Corneliu Catalin Ponta, Senior Researcher, Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), ROMANIA

Mr Arthur Gareev, Head, Polymer Composite Materials Department, ROSATOM, RUSSIAN FEDERATION

Mr Umesh Kumar, Head, Industrial Tomography and Instrumentation Section, Bhabha Atomic Research Centre (BARC), INDIA

13:00–14:30 Lunch break

14:30–15:30 Panel Discussion: The Path Ahead

This panel session will discuss the relevance and added value of radiation technology in a wide range of industries to support countries' development efforts.

Ms Alumanda M. Dela Rosa, Director, Philippine Nuclear Research Institute(PNRI) PHILIPPINES

Mr Paul Gray, Vice President, External Relations and Global Logistics, Nordion Inc., CANADA

Mr Benoit Mullier, Vice President, Facility and Process Engineering, Industrial and Sterilization Solutions (IBA), BELGIUM

Mr Iqbal Hussein Khan, Director, Pakistan Institute of Nuclear Science and Technology (PINSTECH), PAKISTAN

15:30–16:30 Open Forum for Member States

During the Open Forum Member States can make statements on their experience and ask questions.

16:30–17:00 Conclusion/Closing

Mr Yukiya Amano, Director General, IAEA

Mr Mahama Ayariga, Minister, Ministry of Environment, Science, Technology and Innovation, GHANA

Mr Jose Fidel Santana Nuñez, Vice Minister, Ministry of Science, Technology and Environment (CITMA), CUBA

Ms Lydia Parades Gutierrez, Director General, Instituto Nacional de Investigaciones Nucleares (ININ), MEXICO

OPENING SESSION

Mr Yukiya Amano

IAEA Director General

Yukiya Amano is Director General of the International Atomic Energy Agency. Mr Amano served as Chair of the Agency's Board of Governors from September 2005 to September 2006. He was Japan's Resident Representative to the Agency from 2005 until his election as Director General in July 2009. He assumed his duties as IAEA Director General on 1 December 2009. In March 2013, the IAEA Board of Governors appointed him to a second four-year term. Mr Amano has extensive experience in disarmament and non-proliferation diplomacy, as well as nuclear energy issues. At the Japanese Foreign Ministry, he was Director General for the Disarmament, Non-Proliferation and Science Department from 2002 until 2005. He previously served as a governmental expert on the U.N. Panel on Missiles and on the U.N. Expert Group on Disarmament and Non-Proliferation Education. Mr Amano contributed to the 1995, 2000 and 2005 Nuclear Non-Proliferation Treaty Review Conferences, and he chaired the 2007 Preparatory Committee for the 2010 Nuclear Non-Proliferation Treaty Review Conference. A graduate of the Tokyo University Faculty of Law, Mr Amano joined the Japanese Foreign Ministry in April 1972, when he began a series of international postings in Belgium, France, Laos, Switzerland, and the United States.

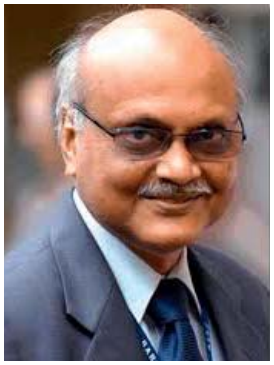
Mr Sergey Kirienko

Chief Executive Officer, ROSATOM, Russian Federation

Sergey Kirienko is Chief Executive Officer of the State Atomic Energy Corporation ROSATOM in the Russian Federation. Before undertaking this position in 2007, he was Director of the Federal Agency for Atomic Energy for two years. In December 1999, Mr Kirienko was elected a member of the Russian Parliament and shortly after that, he was appointed Presidential Plenipotentiary Representative to the Volga Federal District. A year later he took the office as Chairman to the Russian Federation Committee on Chemical Disarmament. Mr Kirienko held the office of Russian Prime Minister for five months in 1998. He was Chair of the Management Board of Garantia Bank and served on the Presidential Council for Industrial Policy and Entrepreneurship. In 1996–1997, Mr Kirienko occupied the office of President of NORSI-Oil prior to being appointed First Deputy Minister in May 1997, and then Minister of Fuel and Energy in November of the same year. He has degrees in Water Transport from the Gorky Institute and in Finance and Banking from the Russian Presidential Academy of National Economy.

Mr Ratan Kumar Sinha

Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Government of India, India



Ratan Kumar Sinha is Chairman of the Atomic Energy Commission and Secretary to the Department of Atomic Energy of the Indian Government. He is a nuclear engineer specialized in advanced reactor technologies and thorium-based reactor technologies. Mr Sinha is the overall manager for India's nuclear power programme, associated fuel cycle activities as well as other nuclear applications in the area of health care, food and agriculture, industry, water resources and the environment. Mr Sinha has been closely associated with several programmes of the IAEA, including the prestigious International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO). He was Chairman of the INPRO Steering Committee for four years.

Mr Taylor Wilson

Nuclear Physicist, United States

Taylor Wilson is a nuclear physicist from the United States. In 2009, at age 14, he became the youngest person in history to work with nuclear fusion, and after that developed several innovations in the area of nuclear energy. In addition to running his commercial endeavours, Mr Wilson directs several academic laboratories for fundamental and applied research in nuclear science. He is the recipient of many prestigious awards, including the Thiel Fellowship and the Intel Foundation Young Scientist Award. Mr Wilson's main area of interest is how to apply nuclear technology to produce energy, fight cancer and combat terrorism.

BATTLING THE BUGS

Mr Josef Mittendorfer

High Tech Consulting, Austria

Josef Mittendorfer is a consultant in radiation processing with High Tech Consulting in Austria. His main areas of work are process development and control, mathematical modelling, qualification and validation, dosimetry and statistical analysis, among others. Mr Mittendorfer is Chairman of the American Society for Testing and Materials (ASTM) Task Group and Delegate to ISO TC 198. He is also the author of many articles and booklets related to radiation physics and was a speaker at many IAEA, IMRP and IRAP conferences. Mr Mittendorfer holds a PhD in High Energy Physics.

Ms Celina Ines Horak

Comisión Nacional de Energía Atómica (CNEA), Argentina

Celina Horak is Head of the Department of Radiation Processing Application at the CNEA. In this capacity, she is responsible for the microbiology, polymeric materials, biocompatibility and cell cultures, entomology and food irradiation laboratories. Ms Horak is a specialist in radiation sterilization and has worked with the National Atomic Energy Commission in Argentina for 23 years. She is also a scientific adviser to the Argentinian National Institute of Ablation and Transplantation of Organs, Tissues and Cells. Ms Horak has worked on various research and technical cooperation projects as well as participated in expert groups to develop the IAEA Code of Practice for Radiation Sterilization of Human Tissue Grafts, Validation Process and Routine Control.

Mr Justin Davies

Australian Nuclear Science and Technology Organization (ANSTO), Australia

Justin Davies is Leader in Radiation Technology with ANSTO and in this capacity manages a range of cobalt-60 irradiation facilities that provide low- and high-dose irradiation and dosimetry capabilities. The applications include radiobiology, radiotherapy dosimetry, material radiation hardness studies, national security, agriculture, horticulture, immunology, medical sciences and biotechnologies. Mr Davies is an expert in ionizing radiation dosimetry - from low doses, such as for life sciences, to radiotherapy level and high-dose applications, such as microbicidal effectiveness studies.

Ms Yuwei Zhang

Wuxi El Pont Radiation Technology Company, China

Yuwei Zhang is Vice President of Wuxi El Pont Radiation Technology Company in China. She is responsible for research and development and overseas market development, specializing in e-beam innovation both in high frequency high voltage and linac types, irradiation technology in inspection and quarantine and other novel applications. Ms Zhang is also Vice Dean of the China Isotope and Radiation Association and a distinguished expert at the Wuxi Entry-Exit Inspection and Quarantine Bureau. She has a PhD in Mechanical Engineering from the University of Bristol in the United Kingdom.

Mr Wilson Aparecido Parejo Calvo

Nuclear and Energy Research Institute (IPEN), Brazil

Wilson Aparecido Parejo Calvo is Materials Engineer and Senior Researcher at the Nuclear and Energy Research Institute of the National Nuclear Energy Commission in Brazil. For twelve years he was Head of the Radiation Technology Centre, advocating the use of radiation technology and radioisotope applications in industry, human health, agriculture and the environment. Currently, Mr Calvo is Administrative and Infrastructure Director at IPEN as well as a professor and graduate advisor.

Mr Masao Tamada

Japan Atomic Energy Agency (JAEA), Japan

Masao Tamada is Director General of the Takasaki Advanced Radiation Research Institute, Sector of Nuclear Science Research at the Japan Atomic Energy Agency. He has been working for 35 years in the radiation processing of polymers, especially graft polymerization. Mr Tamada's work focuses on applied research of enzyme immobilization for biomass saccharification, metal adsorbents for the recovery of uranium from seawater and rare metal from hot spring water, and solid catalyst for biodiesel conversion, among others. He is also a national project coordinator for radiation processing of polymers at the Radiation Control Agency and the project leader for electron accelerator application at the Forum for Nuclear Cooperation in Asia.

SOLUTIONS FOR POLLUTION

Mr Bumsoo Han

EB-Tech. Co. Ltd., Republic of Korea

Bumsoo Han is CEO and President of EB-Tech. Co. Ltd., a company engaged in manufacturing industrial electron accelerators. One of Mr Han's major interests is the use of radiation technology for environmental remediation. He played a key role in setting up the first industrial scale electron beam facility for the treatment of wastewater at a textile industry complex. Recently, Mr Han and his associates developed a mobile electron beam facility that can be taken to site locations to demonstrate the applicability of the technology under real working conditions to end users. Mr Han is recipient of several prestigious awards and has been serving as a board member of the Korean Association for Radiation Applications since 2009. He holds a PhD in Metallurgical Engineering from the Colorado School of Mines in the United States.

Mr Andrzej Chmielewski

Institute of Nuclear Chemistry and Technology (INCT), Poland

Andrzej Chmielewski is Director General of the Institute of Nuclear Chemistry and Technology in Poland, which is an IAEA Collaborating Centre for radiation technology and industrial dosimetry. He is in charge of several radiation facility constructions. Mr Chmielewski is also a professor at the Warsaw University of Technology, an internationally recognized expert and lecturer, and the author of more than 150 scientific papers and books. He is a member of many well-recognized associations and organizations related to nuclear energy, including of the IAEA's Standing Advisory Group for Nuclear Applications (SAGNA).

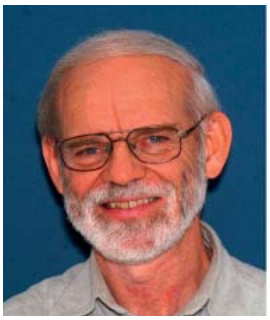
Ms Catherine Hughes

Australian Nuclear Science and Technology Organisation (ANSTO), Australia

Catherine Hughes is Senior Research Scientist at ANSTO's Institute for Environmental Research. She has 20 years of experience in tracing water, sediment and contaminant movement in groundwater, reservoirs, catchments and coastal water bodies using stable isotopes and artificial or naturally occurring radioisotopes as environmental tracers. Ms Hughes is also involved in investigating the movement of radioactive contamination in groundwater and sewage effluent and the impact of such radioactive releases on biota in the environment. She has been involved in IAEA/RCA activities teaching and demonstrating applications of radiotracer technology to coastal engineering and environmental problems in Asia since 1999. More recently, Ms Hughes has contributed to the drafting of IAEA publications relating to environmental radiotracing. She has also been responsible for conducting the first risk assessments of radiation dose to animals and plants arising from field scale radiotracer studies.

Mr Tor Bjørnstad

Institute for Energy Technology (IFE) and University of Oslo, Norway



Tor Bjørnstad is Chief Scientist at the Institute for Energy Technology (IFE) and a professor of nuclear chemistry at the University of Oslo. He has 40 years of experience in research and development in basic and applied radiochemistry, focusing on petroleum-related activities. His research interests also include the development of tracer technology for reservoir description and dynamics, industry standard tracer methods and tracer development for studying oil recovery mechanisms, among others. Mr Bjørnstad has participated as chief investigator in several IAEA-coordinated research projects on the development and application of radiotracers and nuclear methods for industrial monitoring. He is the author of more than 150 scientific and technical papers and conference contributions.

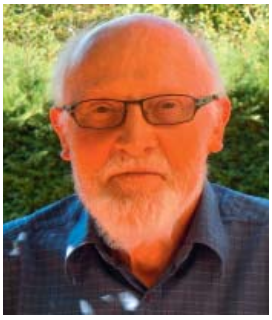
Ms Haifa Ben Abdelouahed

Centre National des Sciences et Technologies Nucléaires (CNSTN), Tunisia

Haifa Ben Abdelouahed has been an assistant professor at the Centre National des Sciences et Technologies Nucléaires since 2011. In this capacity, she is involved in teaching and research and development in the field of nuclear sciences and technologies. Ms Abdelouahed's research and work focus on radiotracer techniques and nucleonic gauges applications in industry. From 2001 until 2011, she was Head of Laboratory on spectrometric radio-analytical techniques at CNSTN. Ms Abdelouahed has also worked with the IAEA on various projects.

Mr Jean Louis Boutaine

French Atomic Energy Commission (CEA), France



Jean Louis Boutaine was Head of the Research Department of the Centre for Research and Restoration of the Museums of France for more than 20 years before his retirement in 2002. He is also a former lecturer in nuclear physics at Ecole Centrale Paris and a professor of industrial radiology at Conservatoire National des Arts and Metiers Paris. Mr Boutaine worked for more than 30 years with the French Atomic Energy Commission. He also served as an expert for IAEA technical cooperation projects and EU research programmes in science and technology for cultural heritage.

Mr Bernard Malherbe

Jan De Nul Group, Belgium

Bernard Malherbe is a geological engineer and is currently Director of Project Development at Jan De Nul Group, a company providing services related to the construction and maintenance of maritime infrastructure. Mr Malherbe is an expert in coastal and maritime engineering. Prior to joining the Jan De Nul Group, he was Business Development Manager at the consulting engineering company Haecon.

Mr Martin Jech

AC²T research GmbH, Austria

Martin Jech has been Leader of the research area Friction Surface Phenomena and Tribodiagnostics at the Austrian Competence Centre for Tribology (AC²T) since 2010. He is an expert in the science and engineering of interacting surfaces in relative motion and principle scientist for characterisation of nanoscopic wear. Mr Jech holds a PhD from the Vienna University of Technology.

BOLSTERING SAFETY AND QUALITY

Mr Winfried Petry

Research Reactor Heinz Maier-Leibnitz (FRMII) and Technical University of Munich, Germany

Winfried Petry is Scientific Director of the Neutron Research Reactor Heinz Maier-Leibnitz (FRM II) and a professor at the Technical University of Munich. His research areas are the investigation of the functional properties of materials such as proteins, polymers and viscous liquids, and the shape-memory alloys by means of light-, X-ray and neutron-scattering. He is an expert in exploiting neutron sources for basic science, industry and medicine. Mr Petry designed the instrumentation of the FRM II and is Head of the FRM II working group for developing high-density uranium fuels. Previously, he worked as a scientist with the European Institute for Neutron Research and the Institut Laue–Langevin in France. Mr Petry is also Founding Director of the Heinz Maier-Leibnitz Zentrum (MLZ), which seeks to advance neutron research in Germany.

Mr Abdul Nassir Bin Ibrahim

Malaysian Society for non-destructive testing (NDT) and Madani NDT Training Centre, Malaysia

Abdul Nassir Bin Ibrahim is President of the Malaysian Society for NDT and Managing Director of the Madani NDT Training Centre. After obtaining his PhD in Metallurgy from the University of Surrey in the United Kingdom, he worked as a researcher specialized in NDT at the Malaysian Nuclear Agency for 35 years and became Director of the Industrial Technology Division before retiring in 2014. He played a key role in establishing the Malaysian Qualification and Certification Scheme for NDT Personnel in 1986. Mr Bin Ibrahim has also worked as a technical officer for NDT with the IAEA and was involved in around 60 international expert missions. He is furthermore the author of 18 books and more than 50 scientific papers published in national and international journals.

Ms Loveetah Chummun Bhujohory

Mauritius Standards Bureau (MSB), Mauritius

Loveetah Chummun Bhujohory is Acting Head of the Mauritius Standards Bureau's Engineering Unit. Before joining the Bureau in 1994, she worked on the design of reinforced concrete structures and steel structures with private companies. Ms Bhujohory played a key role in setting up the MSB's civil engineering laboratory, which offers services in testing building materials to the Government of Mauritius, the public and the private sector. She also coordinates several IAEA projects as well as NGO projects with the European Union on climate change and citizenship. Furthermore, Ms Bhujohory teaches theory of structures and civil engineering management at the University of Mauritius and is a member of the Construction Industry Development Board.

NON-DESTRUCTIVE TESTING FOR DEVELOPMENT, TRAINING AND QUALIFICATION OF PERSONNEL

Mr Mike Farley

International Committee for Non-Destructive Testing (ICNDT), United Kingdom

Mike Farley has been Chairman of the International Committee for Non-Destructive Testing (ICNDT) since 2008. Prior to taking this position, he was President of the European Federation for NDT as well as President of the British Institute of NDT. Mr Farley was also Head of the NDT research and development and inspection services for "Doosan Babcock", a power plant equipment and services supplier.

Mr Sean Blake

Southern African Institute of Welding (SAIW), South Africa

Sean Blake has been Executive Director of SAIW since 2009. In this capacity, he is responsible for managing the SAIW's operations including training, qualification and certification activities. Prior to this position, Mr Blake was Technical Manager with Amalgamated Welding and Cutting, Manager for Controlled Atmospheres with African Oxygen Limited, and Senior Metallurgist with the steel manufacturer Highveld Steel and Vanadium.

Mr Sigit Budi Santoso

National Nuclear Energy Agency (PAIR-BATAN), Indonesia

Sigit Budi Santoso is Senior Researcher at the Centre for Isotopes and Radiation Application of the Indonesian National Nuclear Energy Agency (PAIR-BATAN). He is responsible for research and development activities in the field of non-destructive evaluation (NDE), which includes planning, implementation and application of NDE for material testing and industrial processing units. Mr Santoso has been working for PAIR-BATAN since 1989 and has been involved in many IAEA technical cooperation projects.

Mr Rachad Alami

Centre National de l'Energie des Sciences & des Techniques Nucléaires (CNESTEN), Morocco

Rachad Alami has been Head of the Division of Industrial Applications at CNESTEN, the Mooroccan nuclear research centre, since 1988. His research focuses on nuclear technology applications in industry, including applications of nucleonic control systems, sealed sources, radioactive tracers and non-destructive testing. He is also Secretary General of COMEND, the Moroccan NDT personnel certification system.

RAYS OF HOPE

Ms Clelia Dispenza

University of Palermo, Italy

Clelia Dispenza is Associate Professor of chemistry and functional nanomaterials at the University of Palermo, Italy, where she heads the bio nanomaterials and composites lab. Her research focuses on the design, synthesis and characterization of polymeric, composite and bio-hybrid materials as functional or structural elements for applications in healthcare, consumer products, smart packaging and aeronautics. Due to the multidisciplinary nature of her research, Ms Dispenza collaborates with experts from various industries and academic disciplines. She holds a PhD in Chemical Technologies and Advanced Materials.

Mr Khairul Zaman Bin Haji Mohd Dahlan

Polycomposite Sdn Bhd, Malaysia

Khairul Zaman Bin Haji Mohd Dahlan was Director of the Division of Radiation Processing Technology at the Malaysian Nuclear Agency (MNA) for more than ten years before he retired in 2011. He was responsible for the national development of the radiation processing technology program, which included research and development projects, and setting up laboratories and pilot plant facilities. Mr Bin Haji Mohd Dahlan also played a key role in establishing MNA as an IAEA Collaborating Centre for Radiation Processing of Natural Polymers. He has served as an expert in various IAEA technical meetings and has undertaken many missions to other Member States. Currently, he is Technical Director for the manufacturing of natural fibres plastic composites for automotive and industrial applications with the the Polycomposite Sdn Bhd.

Mr Corneliu Catalin Ponta

Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Romania

Corneliu Catalin Ponta is Chemical Engineer and Researcher at the Horia Hulubei National Institute for Physics and Nuclear Engineering in Romania, where he established, developed and managed the IRASM Irradiation Processing Centre. The institution was built within the framework of an IAEA technical cooperation project and focuses on research and development and industrial radiation treatments, as well as on the promotion and implementation of gamma irradiation applications. Recently, using irradiation for the preservation of cultural heritage has been one of Mr Ponta's main areas of work. This technology is now frequently used by museums, archives, libraries and other stakeholders in Romania. Mr Ponta is also actively involved in IAEA projects related to the preservation of cultural heritage.

Arthur Gareev

ROSATOM, Russian Federation

Arthur Gareev is Head of the Polymer Composite Materials Department at ROSATOM. In this capacity, he is responsible for the research and development of composites materials technology and production. Before undertaking this position in 2012, he was Major Housing Repairs Department Specialist with the Moscow City Government. Mr Gareev holds a PhD in 3-dimensional carbon-fiber-reinforced polymer.

Mr Umesh Kumar

Bhabha Atomic Research Centre (BARC), India

Umesh Kumar is Head of the Industrial Tomography and Instrumentation Section at the Bhabha Atomic Research Centre. He has 25 years of experience in research and development activities in radiation and radioisotope-based imaging, and computed tomography for industrial applications. His research focuses on industrial radiology, digital radiography and computed tomography for non-destructive testing and evaluation. Mr Kumar is recipient of several prestigious awards such as the Scientific and Technical Excellence Award from the Department of Atomic Energy of the Government of India. Mr Kumar has also worked on various projects with the IAEA.

THE PATH AHEAD

Ms Alumanda Dela Rosa

Philippine Nuclear Research Institute (PNRI), Philippines

Alumanda Dela Rosa is Director of the Philippine Nuclear Research Institute (PNRI), which she joined in 1968. Her main research areas include, among others, radiation chemistry for the development of products from indigenous natural polymers using radiation, environmental chemistry and coastal pollution due to heavy metals and harmful algal blooms. As PNRI Director, Ms Dela Rosa has worked for a more active participation of the institute in research and development, technology transfer and in normative activities of the IAEA. Her scientific work was recognized by the Philippine Scientific Career Council (SCC) with her conferment of the rank of Career Scientist IV in 1991 – the highest rank so far conferred by the SCC. Ms Dela Rosa holds a PhD from the University of Hawaii.

Mr Paul Gray

Nordion Inc., Canada

Paul Gray is Vice President, External Relations and Global Logistics, at Nordion Inc. and Chairman of the International Source Suppliers and Producers Association (ISSPA). Since he joined Nordion Inc. in 1986, he has held managerial positions in various areas including operations, facilities, regulatory affairs, and package and facility engineering, among others. In his current position, he also collaborates with the IAEA, the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO). Mr Gray is also former Chairman of the IAEA's International Steering Committee on the Denial of Shipment of Radioactive Materials. He is also Chairman of the Gamma Industry Processing Alliance (GIPA) and Co-Chairman of the Transportation Committee of the Council on Radionuclides and Radiopharmaceuticals (CORAR).

Mr Benoit Mullier

IBA Industrial, Belgium

Benoit Mullier is Vice President, Facility and Process Engineering, at IBA Industrial. In this capacity, he is responsible for the evaluation, analysis and development of irradiation solutions for mature and emerging applications using particle accelerators. Mr Mullier has been working for IBA for 25 years and has held many managerial positions, including Vice President of the technology group in charge of the Louvain-La-Neuve facility and Head of the Engineering Department. Mr Mullier holds a Master's degree in Physics from the University of Louvain in Belgium.

Mr Iqbal Hussein Khan

Pakistan Institute of Nuclear Science and Technology (PINSTECH), Pakistan

Iqbal Hussein Khan has been Chief Engineer and Director General of the Pakistan Institute of Nuclear Science and Technology (PINSTECH) since 2014. In this capacity, he manages the technical programme of the Institute and provides administrative support to achieve desired objectives. Before undertaking this position, Mr Khan was Director of Technology and Director of Coordination at PINSTECH. He has 30 years of experience in isotope hydrology and in the industrial application of radioisotope technology. Mr Khan was actively involved in many IAEA projects related to applications of nuclear techniques to help solve end-user problems.

CLOSING SESSION

Mr Mahama Ayariga

Minister of Environment, Science, Technology and Innovation, Ghana

Mahama Ayariga was nominated for appointment as Minister of Information of Ghana in January 2013. He later became Minister of Youth and Sports and is currently Minister of Environment, Science, Technology and Innovation. In 2009, he was Spokesperson for Ghana's former President and was subsequently appointed Vice Minister of Trade and Industry. He was later assigned to the position Vice Minister of Education. Mr Ayariga also co-founded and was Executive Director of the Legal Resources Centre, an organization which promotes human rights, community development and social justice. He holds a Master's degree in Law from Harvard University in the United States.

Mr Jose Fidel Santana Nuñez

Vice Minister of Science, Technology and Environment, Cuba

Jose Fidel Santana Nuñez is Vice Minister of Science, Technology and Environment of Cuba. He majored in nuclear engineering at the University of Havana and holds a Master's degree in Business Administration from the same university. Before undertaking his current position, he was Director of the Nuclear Regulatory Body in Cuba and President of the Cuban Nuclear Agency. He has been workong on projects related to the nuclear national program for the last 30 years.

Ms Lydia Parades Gutierrez

Director General, Instituto Nacional de Investigaciones Nucleares (ININ), Mexico

Lydia Parades Gutierrez is Director General of the Nuclear Research National Institute of Mexico and National Coordinator of the ARCAL Program with the IAEA. Prior to undertaking this position, she was Senior Operator for the Nuclear Research Reactor TRIGA Mark III at ININ. She was working on projects related to radiation technology in industry, medical application, nuclear research reactor, radiological protection and dosimetry. Currently, she is President of the Nuclear Engineering Section at the Mexican Engineering Academy (2012-2016). Ms Parades was also President of the Mexican Nuclear Society (2002-2003). She is the author and co-author of 33 scientific articles in international and national journals, and holds a PhD in Medical Physics.

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