DBT-TDNBC-DEAKIN–RESEARCH NETWORK ACROSS CONTINENTS FOR LEARNING AND INNOVATION (DTD-RNA) NEWSLETTER

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MESSAGE FROM

DR ALOK ADHOLEYA

DTD-RNA COORDINATOR,
DIRECTOR, TDNBC,
PROGRAM DIRECTOR, TERI

Imbalanced use of chemical fertilizers creates nutrient imbalance of soil, leaching losses, reduced productivity besides environmental problems.

The inefficient delivery of agrichemicals agriculture-production systems is threatening food security, and quality, thereby causing wasted energy, water as well as negative environmental impacts. Such inefficiencies are on account of the failure to deliver the active ingredient in the right dose to the target site when it is needed. The changing climate and loss in productive/fertile soil adds to farmer's woes. Nanotechnology-enabled agriculture possesses the capability to mitigate many of these "farm to fork" problems, in particular, the inefficiencies in agrichemical delivery and food safety. Therefore, it is important to integrate other sources of plant nutrients, recycling of crop residues and judicious use of beneficial, natural resources including microbes.

Nanobiotechnology can advance cutting edge research while fostering innovation and collaborative translational research to support the areas of agriculture, food and environment. The TERI Deakin Nanobiotechnology Centre (at TERI) in partnership with Department of Biotechnology, Government of India has been organizing the International Conference series on "Nanobiotechnology for Agriculture" since 2017 with the intention to promote research in agriculture nanotechnology and translational research to support agriculture and allied areas. Nanoforagri has provided an interactive arena for networking of researchers, building collaborations, and a platform for budding young scientists and research scholars. This year, in its 4th Edition, Nanoforagri chose the theme "Application of Nanotechnology for Sustainable, Productive and Safer Agriculture and Food System" which is not only very important but also timely due to the United Nations declaring 2020 as the "International year of plant health". Due to the ongoing COVID19 pandemic, the conference was held in an online mode with a very rich technical program with invited Global Leaders and Emerging Research Leaders from across the world presenting their work on different aspects of nanotechnology and allied

areas which will impact agriculture, food security, plant health and productivity. The 4th Nanoforagri was truly interdisciplinary in nature and also highlighted global challenges and harmonized systems for nano solutions for agriculture and food systems. Domain experts from USA, Canada, Spain, Ireland, Australia and India delivered talks on the session themes.

Thematic talks and discussions in the conference focused on various aspects of nanotechnology for enhancement of crop nutrition and its protection, post- harvest management, food preservation, toxicity of agri-nano products and regulatory and compliance challenges for translational research in food and agriculture sectors across 5 sessions. The Science-Society-Policy actions for Agriculture and Food Nanotechnology being spear-headed by DBT and supported by TERI were a key focus of the conference. This virtual event also saw Scientist and Scholar Oral Research Pitches providing a glimpse into some selected pioneering research projects. This conference involved thought-provoking discussions between the ~150 participants in related fields and focused on developing scientific linkages across different themes to foster innovation and targeted solution development for challenges in agricultural research. The Conference highlighted the key areas requiring interventions and also how nano-enabled systems will help address contemporary issues in agriculture related to efficient delivery of fertilizers, pesticides and nutrients, post-harvest management, soil conservation, pathogen detection and for the farm and food sector.

Enhancing soil productivity using innovative nanotechnology-based solutions while increasing the farm output of food grains will require prioritization of future research goals and multidisciplinary translational research of disruptive ideas from the bench to the field as products. Cross border, active research collaborations will be truly instrumental in creating impact and accelerating product development to the benefit of mankind.

The current global outbreak of COVID-19 has disrupted agricultural and food systems around the world. Many countries have introduced measures that reduce population and labor mobility in view of the COVID-19 outbreak. This has compromised the agricultural tasks, turning the health to a production system shock. If agricultural tasks are not performed on time, the world may witness major crop failures which would pose huge risk to future food availability and security. Let's work and promote the technologies which offer solutions during this crisis and beyond.

I wish all of you and your families a very healthy and safe 2021!

Message from
DR LARS MONTELIUS
DG, INL, Braga

"In conjunction with the State Visit of the President of Portugal to India on February 14, 2020, it was announced that INL and the TERI-Deakin Nanobiotechnology Center (TDNBC) in Gurugram had signed an MoU".

During 2020 we have witnessed a very good start in the relations between INL and TERI-Deakin. Several common research project applications have been submitted to specific India-Portugal calls, arranged a joint webinar and a number of more webinars are under preparations. We at INL are very much looking forward to a further deepened relation with TERI-Deakin. The intent behind the DTD-RNA network is very well aligned to INL strategic goals and we are convinced that international collaboration activities are the key for having success in putting nanotechnology as a driver for societal development. We cannot wait to further engage with the DTD-RNA network and introduce the networks in Europe that we have been creating together with EC commission the last decade. Just to give one example of such a network is the EPPN, the European Pilot Plant Network, that, as the name implies, is a pan-European network that offers access to hundreds of pilot plants in nanotechnology and advanced materials.

I am very grateful for the possibility given to me to briefly describe INL, the International Iberian Nanotechnology Laboratory, Headquartered in Braga, Portugal. INL is one of the few intergovernmental research organisations worldwide, and the only one with a focus on nanotechnology. INL was inaugurated in 2009 with the intention to create a world class laboratory with the aim to develop and rapidly translate new nano-based technologies into the market, create new know-how and intellectual property, collaborate with existing companies as well as stimulate the creation of new spin-off start-ups.

INL has during the last six years developed from about 60 persons to more than 450 persons from about 40 different countries. The strong interdisciplinary operational focus and the diversity of talented people with various backgrounds, education, skills, knowledge, and cultural values, together with its excellent facilities, are the assets that make the difference and make INL stand out.

INL is devoted to deploy its capacity and foster the use of nanotechnology

to address the grand challenges of today, aligned with the United Nations Sustainable Development Goals in the following areas: Smart Digital NanoSystems, Advanced Materials and Computation, Clean Energy, Personalized Precision HealthTech, Sustainable Environment and last but not least, FoodTure.

Transversal to these areas is a strong competence on Sensors and Sensor Systems that address all kind of nano-sensor technologies (electrical, magnetic, optical, electromechanical, electrochemical, pressure and quantum-based) into systems including data-aggregation and data-communication. We do that from the basis of Nanotechnology, being an enabler for devices, sensors and smart systems that will create data streams that can have its outcomes in many different ways. These sensors are integral to IoT and all associated developments within the often expressed Trillion of Sensors Economy such as Industry 4.0, electrification, smart cities, smart buildings, smart building envelopes, smart infrastructures, smart environment etc.

INL was conceived to assure world-class research excellence in all of its activity areas and to:

- Develop partnerships with the industry and foster the transfer of knowledge into economic value and jobs;
- Train researchers and contribute to the development of a skilled workforce for the nanotechnology industry, through the implementation of joint training programs with governments, universities and RTD centres;
- Attract international companies;
- Develop a technology transfer system for the service of industry;
- Prevent and mitigate nanotechnology risks.

INL follows an interdisciplinary approach that stimulates the cooperation and engagement among stakeholders in the generation of novel ideas and turning them into innovation. This approach includes an effective form of co-operation and co-creation among organizations, which promotes access to the most promising available technologies and fosters the integration of stakeholders in the development process, who jointly co-create mutually valuable results. By partnering with INL, large enterprises, SMEs and start-ups have access to an ecosystem that represents a complete value chain, from the synthesis of nanoparticles and fabrication of microsystems to final added-value products, technologies, and processes.

INL delivers compounded knowledge and is an integrating solution provider through research projects, generated knowledge and skills in combination with our global outstations, INL Innovation Hubs, and partners' capacities. The new paradigms in the research arena at European and international levels show that it will be governed by integration. The ability to articulate missions is increasingly necessary. We strive to be "cathedral builders" rather than "stone cutters". The actors that excel in articulation and, as a consequence, also excel in integration and compounding knowledge, will be the winners in research as well as in the market domains.

The year of 2020 has been a very special year. We, the people, have all been witnessing how hard the society at large has been affected by the Sars-Cov-2 pandemic. It has led to tragical consequences that has cut deep soars into all countries. We will all remember this year.

At INL, we have stood up as one family, committed to handle the Covid-situation with clarity and efficiency, always having the safety of INLers as our priority, but also serving the society at full steam and continuing to, what we do the best, deliver our knowledge and competences to the society by breaking new grounds expanding our knowledge space.

During this year we at INL have successfully fulfilled the first steps to meet the INL 2030 Strategic Vision. We have clearly defined activity plans, missions and ambitions of our six areas of INL core activities into six clusters being: Smart Digital NanoSystems, Advanced Materials and Computation, Clean Energy, Personalized Precision HealthTech, Sustainable Environment and last but not least, FoodTure. This participatory process has successfully aligned all 25 research groups at INL as well as the various support departments of INL, in a collaborative matrix structure. The members of our International Business Advisory Board have been instrumental in coaching this process. Further, during this year we have initiated the process to build up a strong competence in the nano-Safety field by establishing a transversal research group through the ERA-Chair Symphonia project. Right now, we are establishing a strong Engineering Support Team that will be instrumental for reaching our ambition for the next decade in relation to a substantial increase of our Commissioned Research activities. As an integral part of this ambition, we have further streamlined the user facilities at INL, the Micro and Nano-Fabrication Lab, the nano-Photonics and Bio-Imaging lab and the Advanced Electron Microscopy, Imaging and Spectroscopy Lab, offering enhanced services both internally and externally.

As a consequence of the reduced world-wide travel, we have conducted several fully digital events at INL with record participation. Our recent internal Annual Research Symposium, just being conducted, was a big success showcasing how digital conferencing can become a better format for increased participation and for stimulating new ideas. As an example, the poster session was brought live by replacing the traditional poster with short very creative videos that made the messages to stand-out, creating a much larger interaction among our research community. During this year we also launched for the first time the INL Research Project Awards and the INL Idea Awards with substantial prizes made possible by a contribution from a number of Founding (Industrial) Partners from all over the world.

The year of 2020 has also been characterized by a large increase in capturing external funding and we have been very successful in a number of large European and national projects. Especially noted are the increased funding and activities related to fight the Covid situation. Here the INNOV4COVID cascade funding project that INL is leading is worth to mention. At INL we early on put together an in-house concerted action related to detection of Sars-Cov-2 virus that brought us all together and we quickly identified a number of new innovative ways for diagnostics and for screening. Some of these are, after a remarkable internal research and engineering effort, soon ready to be launched in the market. Also our ambitions in the Green Deal, Batteries and Hydrogen areas have put INL in a favorable position in the European context.

Internally at INL, several activities, some of them not so visible for all, have taken place. The most profound one was the establishment of a Covid-Safety Commission that has been in operation on a nearly 24/7 basis since the beginning of the pandemic. The work has been instrumental for how well INL has been able to cope with the Covid-situation handling everything from developing and continuously updating our Contingency plan, taking care of restrictions and planning schemes enabling our needed presential work, adapting our recommendations and measures, taking care of specialized situations etc. Further, the INL support functions have made outstanding efforts in taking care of a lot of things, such as our digitalization of meetings enabling us to do work from home, health and safety actions, signage and safety-guarding our workplaces, secure our finance activities, provide legal service, continuous site management, HR-functions, funding support, IP support, communication, etc., as well as taking care of needs on an individual basis.

In parallel we have implemented several governance-related activities such as increasing our ISO certifications, enhanced internal communication, our weekly digital nano-FIKA, started our own social channel for continuous social interactions, participation in local societal activities etc. Especially important was setting up our in-house production of face-shields that during the first wave of Covid in the spring were distributed to the care system in north of Portugal and in Galicia, Spain.

In short, the year of 2020 has, although being in the shade of the Sars-Cov-2, been a successful year for INL. I am very grateful to all INLers for their passion, compassion and hard work, making INL to continuously develop, generating new knowledge to the benefit of society.

Now, we at INL are looking forward to deepen our relations with the TERI-Deakin and the DTD-RNA network.

EVENTS ORGANIZED BY DTD-RNA NETWORK DURING SEP-NOV 2020

Webinar on

Microalgal diversity: Potential sources of materials and value-added products and their economy

Date: 3rd September 2020

(Report by Dr Shovon Mandal and Dr Durga Madhab Mahapatra)

TERI Deakin Nanobiotechnology Centre (TDNBC) in association with International Iberian Nanotechnology Laboratory (INL), Portugal have been successful in organizing this webinar with an aim to highlight emerging technologies in Algal research, challenges and opportunities for growth in near future. Dr Alok Adholeya (DTD-RNA Coordinator, TDNBC and chair of the webinar) released the first DTD-RNA Newsletter online that accentuated its intent under this august forum. He solicited all the participants to join the platform in developing International Centre for Translational Research for research training and education in biological synthesis of Nano materials. He emphasized on the importance of microalgal research and set the context for the webinar.

The speakers in the webinar include: Dr. Shovon Mandal (TDNBC), Dr. Jagroop Pandhal (University of Sheffield, UK), Dr. Martin Lopez (INL, Portugal) and Dr. Durga Madhab Mahapatra (TDNBC). Dr. Mandal presented the challenges and futuristic possibilities of algal biofuels with prominence on risk assessment of Genetically Modified (GM) alga in fields and use of consortia for biofuel production. Dr. Pandhal presented the essentials of designing consortia of algae and bacteria for industrial exploitation and elucidated the necessity of meta proteomics in unravelling microbial processes in industrial system and natural ecosystem. Dr. Lopez shed light on intricate diatom exoskeleton enumerating promising properties and its application in nanotechnology. Dr. Mahapatra discussed on circular bioeconomy and algal biofactories from a wastewater perspective.

106 participants from India, UK, Portugal, Italy, United Arab Emirates, Malaysia, and US joined the session. Students, researchers and professionals from both industry and academia took part in the event.

4TH INTERNATIONAL CONFERENCE ON NANOBIOTECHNOLOGY FOR AGRICULTURE NANOFORAGRI 2020

"Application of Nanotechnology for Sustainable, Productive and safer Agriculture and Food System"

5-6th November, 2020

(Report by Dr Mandira Kochar and Dr Reena Singh)

CONFERENCE OBJECTIVES

- Unique Virtual International platform for dedicated exchanges on application of nanoscale science and technology in re-engineering the quality, quantity and safety of agricultural and food systems.
- Due to the current global situation with the COVID-19 Pandemic and immense restriction, the highly-accomplished experts with diversified backgrounds across the globe will discuss and debate from their comfort zones
- Truly interdisciplinary online conference in nature and encompassing basic studies, applications, global challenges and globally harmonized systems for nano solutions for agriculture and food systems.
- Expert discussion on joint projects and bilateral proposals
- Publication in special issue of an internationally reputed peer-reviewed journal
- Oral-Pitch presentations which will give research scholars and students exposure.

Nanoforagri 2020 has provided an interactive arena for networking of researchers, building collaborations, and a platform for budding young scientists and research scholars. Thematic talks and discussions in the conference focused on various aspects of nanotechnology for enhancement of crop nutrition and its protection, post- harvest management, food preservation, toxicity of agri-nano products and regulatory and compliance challenges for translational research in food and agriculture sectors across 5 sessions. The Science-Society-Policy actions for Agriculture and Food Nanotechnology being spear-headed by DBT and supported by TERI were a key focus of the conference. This virtual event also saw Scientist and Scholar Oral Research Pitches providing a glimpse into some selected pioneering research projects. This conference involved thought-provoking discussions between the ~150 participants in related fields and focused on developing scientific linkages across different themes to foster innovation and targeted solution development for challenges in agricultural research. The Conference highlighted the key areas requiring interventions and also how nano-enabled systems will help address contemporary issues in agriculture related to efficient delivery of fertilizers, pesticides and nutrients, post-harvest management, soil conservation, pathogen detection and for the farm and food sector.

CONFERENCE AWARDS

The Conference conferred the following Awards to young researchers who made Oral-Pitch presentations. The awards were given on pre-set criteria and were chosen based on the markings given by the jury, which in turn was formed of Distinguished Researchers.

The Best Oral-Pitch Presentation awards were given to following participants based on the recommendations of jury

Ms Elham-Tavassoli Kafrani (Deakin University) & Ms Shalini Thakkar (TDNBC, TERI)

The topic of presentations were -

- Effect of processing parameters on tapioca starch films - Elham Tavassoli-Kafrani, Australia
- Self-Assembly Of Modified Core Satellite Gold Nanoparticles For Detection Of Arsenic In Water – Shalini Thakkar, India

CONFERENCE GLIMPSES


Event Cell
Anand Gole
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TERI GRAM BOARD RO...
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Begoña Espiña
ANAMIKA PAL
Ankit Kumar
Anurag Nath
ashita anand
Banani Chakraborty
Chanchal Mony
DEBOSHREE GANGULY
Divya Koshy
Dr B Indira Reddy
Durga Mahapatra
kshitij shukla
Mandira Kochar
Natasha Yadav
NEHA SHARMA
Nishith Verma
Paromita Das
Purvi Mathur
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santosh kumari


teri


Regulations for Nano-based products : Global vs. Indian Perspective
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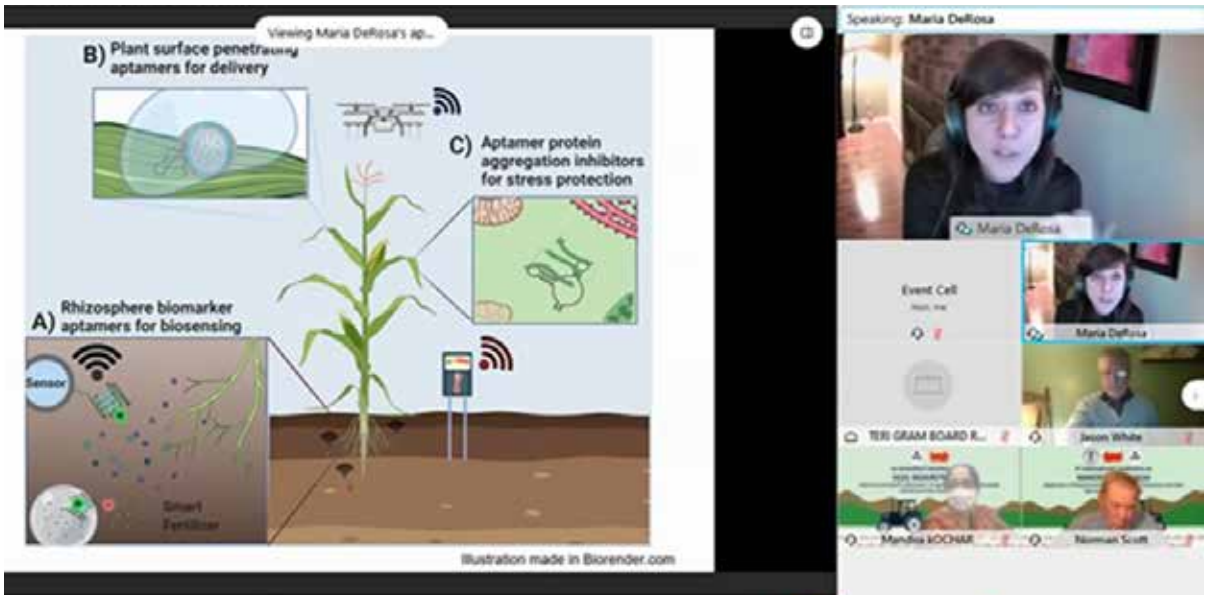

DTD-RNA partners that have joined during September-November 2020:

Industry Partners

- Nanorbital Advanced Technologies LLP, India
- Reinste Nano Ventures Private Limited, India
- Avansa Technology and Services, India

Network Partner

- Asia Nano Forum

Core Institute Partner

- Indian Institute of Science

Upcoming events of DTD-RNA network during January–March 2021

Website (https://www.teriin.org/projects/dtd-rna/events.php)

- Consultative webinar on Ecological Effects of Water and Soil Microplastic pollution
- Online training on quality control of mycorrhiza
- Webinar on Innovations in Industrial Overburdens Management
- Webinar on nanosafety/econanotoxicity and regulatory aspects of nanoproducts
- e-Workshop entitled 'High-End Characterization of Microalgae: Overcoming the Technological Barriers'