



चिंतन

The Monthly Newsletter of IIT Guwahati

Volume III, Issue III, March 2021



Indian Institute of Technology Guwahati
भारतीय प्रौद्योगिकी संस्थान गुवाहाटी
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Prof. T. G. Sitharam, Director, IIT Guwahati, virtually addressing the gathering at Gifu University (1)

IIT Guwahati and Gifu University, Japan, award degrees to the first batch of Joint International Master's Programme Graduates in Food Science and Technology

Indian Institute of Technology Guwahati and Gifu University, Japan, have awarded the first batch of Joint International Master's Programme in Food Science and Technology, in an event on 25th March 2021. This award ceremony was organised at Gifu University, Japan, in the virtual presence of Prof. T. G. Sitharam, Director, Prof. S. K. Kakoty, Deputy Director, IIT Guwahati, Prof. Chitrakleha Mahanta, Dean, Academic Affairs, Prof. Mihir Purkait, Dean, Alumni & External Relations and other dignitaries.

Having located in one of the biodiversity hotspots in Indian, IIT Guwahati has the potential to contribute significantly to the global economy in the area of food science and technology. With this goal, IIT Guwahati and Gifu University have collaborated to offer a Joint International Master's Programme since April 2019 to nurture highly-skilled professionals in food and related industries. Ms. Yume Saito, Ms. Ayaka Tsuchiya, Ms. Haruka Maruyama, and Mr. Tatsushi Aoyagi, completed their graduation after visiting IIT Guwahati for a semester from July 2019 to November 2019 as a part of this programme.

Virtually addressing the gathering, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "This is indeed a historic moment for the Indian Institute of Technology Guwahati and Gifu University, Japan that our joint vision, commitment and collaboration to establish this Joint Degree Programme is finally bearing fruit".

Prof. Sitharam congratulated the four graduates and all the faculty members involved, in making this programme a huge success. He further added, "These programmes should now be a template for all joint degree programmes that are undertaken. The quality of research work and papers that have come out from this programme till date and the quality of students, faculty and researchers will ensure that we become role models in running a successful international collaboration programme".

Prof. Hisataka Moriwaki, President, Gifu University, Japan, also congratulated both the Institutes and wished the graduating class a success in the future. He was accompanied by Prof. Fumiiaki Suzuki, Gifu University Fellow.

Deputy Director of IIT Guwahati, Prof. S. K. Kakoty, in his address underlined that this was a milestone for both the institutions and wished all the students and stakeholders involved in this programme a success.

Prof. Chitralkha Mahanta, Dean of Academic Affairs, IIT Guwahati, in her address highlighted that, "The course and content of the Joint Degree Programme and the stay of Japanese students at IIT Guwahati have enhanced their knowledge and understanding not only of their own academic field but also of the life and culture of the people of India in general and the people of Assam in particular".

"This exchange of academics and culture will continue to foster and strengthen the bonds between our two institutions and our countries", added Prof. Mahanta in her address.

The graduating class students also shared their experiences about the programme and visit to IIT Guwahati and were confident that more students from Japan will take this as an example for opting course.



(In the middle) Prof. Hisataka Moriwaki, President, Gifu University, Japan, along with the graduating class and other dignitaries

Scientists from IIT Guwahati develop an automated system to detect colorectal cancer

A team of researchers from the Indian Institute of Technology Guwahati (IIT Guwahati) led by Prof. Manas Kamal Bhuyan, Professor, Dept of Electronics and Electrical Engineering of IIT Guwahati, along with scientists from renowned research institutes around the world, have designed an automated

Artificial Intelligence-based system to detect colorectal cancer using colonoscopy images. Results of their work have recently been published in a prestigious journal belonging to the Nature group - Scientific Reports. The paper has been co-authored by Dr. Kangkana Bora of Cotton University, Guwahati, Dr. Kunio Kasugai of Aichi Medical University, Japan. Prof. Zhongming Zhao from the University of Texas, Health Science Centre, Houston, USA, and Dr. Saurav Mallik of Harvard University, USA have also contributed to the study.

Colorectal cancer is the third most common type of cancer among men and women in India, but if detected early it can be cured. The commonly used technique to detect colorectal cancer is colonoscopy, in which the specialist - physician, gastroenterologist or oncologist - visually inspects the image obtained by the camera inserted into the colon of the subject. In the current manual approach for colonoscopy examination by physicians, observation bias may sometimes lead to an erroneous diagnosis.

"We have developed an innovative automated system that can help the physician rapidly and accurately detect colorectal cancer from colonoscopy images," says Prof. Bhuyan, Professor, Dept of Electronics and Electrical Engineering of IIT Guwahati. This is important because it prevents delays in diagnosis - quoting the late doyen of oncology Dr. V. Shanta "Fear not cancer diagnosis, but its delay." Furthermore, currently doctors waste a lot of time and energy on manually analysing the images, valuable time that can be spent on devising management and treatment strategies for the patient.

Scientists from Cotton University, Guwahati, Harvard University, University of Texas Health Science Centre Houston and Aichi Medical University, Japan have collaborated with the IIT Guwahati professor in this development. Assisted by his then-post doctorate student, Dr. Kangkana Bora, who is now an assistant professor at the Cotton University, Prof Bhuyan analysed real colonoscopy images generated by Dr. Kunio Kasugai of Aichi Medical University, to develop the AI based cancer detection system.

During the visual examination, specialists check for the presence and features of abnormal tissue growths (polyps) including shape, surface structure and contour to classify them into different categories (neoplastic and non-neoplastic). The multi-institutional team extracted the shape, The multi-institutional team

extracted the shape, texture and color components through artificial intelligence algorithms using different filters. The statistical significance in the contribution of different components was then evaluated, followed by feature selection, classifier selection based on six measures and cross validation.

“Our extensive experiments show that the proposed method outperforms the existing feature-based (conventional) approaches for colonic polyp detection,” the authors write in their paper. To evaluate the robustness of their system, they compared their work with four classical deep learning models and found theirs to be better than others. “Our AI algorithm can be easily integrated with the current methods of diagnosis, which is a significant USP for this work,” says Dr. Kangkana Bora, then the Post Doctorate student of IIT Guwahati and currently Assistant Professor at the Cotton University.

The research team is excited with their results and believe that their work would have a global impact in the detection of colorectal cancer. They plan to commercialize the technology in the future as the market need is enormous. However, before commercialization, they have laid out an ambitious research plan to fine-tune their system.

“The work we have reported only focuses on single frames selected by the doctors. In future, we will integrate it with video tracking and automatic frame selection”, says Prof. Bhuyan. The team also proposes to implement their analytical approach into a computational tool for easy use.



Prof. Manas Kamal Bhuyan
Professor, Dept of Electronics & Electrical Engineering
IIT Guwahati

Dr. Kuriko Kasugai
Asst. Medical University
Japan

Prof. Zhongming Zhao
University of Texas
Health Science Centre
Houston, USA

Dr. Souvik Mallik
Harvard University, USA

Dr. Kangkana Bora
Post Doctorate from IIT Guwahati
Assistant Professor - Cotton University

IIT Guwahati Researchers Develop Modern Drug Development Methods to understand the Therapeutic Action of Ayurvedic Formulations

Prof. Vibin Ramakrishnan, Professor, Department of Biosciences and Bioengineering, IIT Guwahati and Prof. C. C. Kartha of Academy of Cardiovascular

Sciences (<http://cardiovascularsciences.org/>) have used modern drug development methods to analyse the mode of action of an Ayurvedic rejuvenating medicine - Amalaki Rasayana. In their study, the results of which have been recently published in a prestigious Nature partnership journal Systems Biology and Applications, they have shown how Amalaki Rasayana reduces high blood pressure-induced structural and functional changes in the heart.

Prof. Ramakrishnan and Prof. Kartha had earlier found that long term oral intake of Amalaki Rasayana reduces the thickening of heart muscle and improves heart function. The present study that used the emerging scientific approaches of Network Pharmacology and Chemoinformatics shows how the formulation is likely to work in the human body.

Network pharmacology analyses the influence of drugs on diseases as a whole rather than the one-gene-one-target-one-drug approach that has been conventionally followed in drug discovery. Network Pharmacology is effective for developing multi-component therapeutics, which is typical of traditional systems like Ayurvedic and Chinese medicines - the drugs prescribed in these systems act on multiple targets and pathways. Chemoinformatics helps in comparing drug molecules using standardised computational tools.

While Ayurvedic medicines and therapeutics have been handed down over generations and shown anecdotally to be efficacious, they have not yet been subjected to a great extent to the modern methods of drug development. For practitioners of modern medicine, ‘scientific evidence’ means verification of the efficacy and safety of a potential drug, using the tools and procedures employed in modern medical biology. Thus, Ayurveda is often considered as being ‘not scientific’.

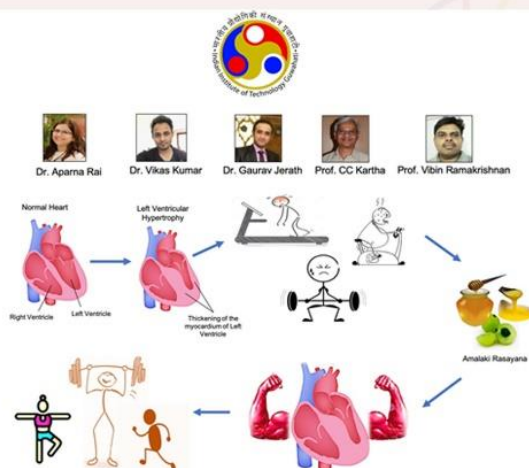
“The hallmark of Ayurvedic system is the long-standing unverified claim that it is a holistic approach; it treats the body as a whole. Multiple components in an ayurvedic medicine are believed to act synergistically to improve a diseased condition. Our analysis using the tools and techniques of modern medicine suggests that this is, indeed, true”, says Prof. Ramakrishnan, Professor, Department of Biosciences and Bioengineering, IIT Guwahati.

The scientists employed in-vivo studies in small animals, gene-expression and proteomics analysis,

informatics tools and the techniques of Systems Medicine, all of which are used in the development of allopathic drugs. They also examined the possible synergy among the actions of different components of the Rasayana using the Network Pharmacology approach.

“This interdisciplinary approach provides opportunities for systematic investigations for unravelling the mechanism of action of multicomponent Ayurvedic medicines from the perspective of a network of normal functional pathways as well as pathways that are altered in chronic diseases”, says Prof. Kartha, Academy of Cardiovascular Sciences.

The work by Prof. Ramakrishnan and Prof. Kartha integrates Ayurveda with the principles and practices of modern medicine to contemporise the former’s ‘holistic approach’ with the latter’s ‘magic bullet’ style.



IIT Guwahati develops technology to serve arsenic and fluoride free drinking water to rural populations of Assam: WORLD WATER DAY 2021

World Water Day is an international observance day, celebrated on March 22 every year to celebrate water and raising awareness of the global water crisis with the core focus of achieving Sustainable Development Goal (SDG) 6: water and sanitation for all by 2030. Researchers at the Indian Institute of Technology Guwahati have developed a technology to provide iron, arsenic, fluoride, and other contaminants-free drinking water to the rural people of Assam with the help of their various prototype units and innovative technology.

Arsenic and fluoride contamination in drinking water is a foremost and growing concern among rural people not only in Assam but also in major parts of the country and IIT Guwahati's technology will succour and assist the Government of India in providing contamination-free drinking water to the people.

Prof. Mihir Kumar Purkait from the Department of Chemical Engineering, IIT Guwahati has developed various types of prototype units (based on nanotechnology, adsorption, and electrocoagulation techniques) for the treatment of Iron, Arsenic and Fluoride contaminated drinking water for household and community purposes. Prof. M K Purkait of IIT Guwahati has also developed and installed many water treatment plants in schools, temples and in the rural areas where pipewater supply is not available.

Case study 1: Water treatment plant (300 L/h) has been installed in the Lathiabagicha Primary School in Guwahati, Assam. This area is highly contaminated with Iron, high COD (Chemical Oxygen Demand) and the water had a bad smell. The school was facing issues to provide fresh drinking water for their students. Prof. M K Purkait installed water treatment plant (300 L/h) in the School. The plant is capable of treating TS, COD (Chemical Oxygen Demand), BOD (Biochemical Oxygen Demand), Iron and Arsenic from contaminated drinking water to much below its BIS (Bureau of Indian Standards) limit. The treated water is also used for cooking of mid-day meals in the school. More than 120 students of this primary school and the villagers of Lathiabagicha (>500) are now able to access good drinking water throughout the year.

Case study 2: Installation of a plant for the treatment of Arsenic, Iron and Fluoride contaminated drinking water in the famous “Doul Govinda Temple” in North Guwahati, India. The plant can treat TS, COD (Chemical Oxygen Demand), BOD (Biochemical Oxygen Demand), Iron, Arsenic and Fluoride contaminated drinking water. The treated water is used by the temple authorities for their day-to-day drinking water requirement in the temple and their guest house. Villagers living near the temple now have access to contaminant-free drinking water. More than 5000 people are using this water every day for drinking purposes now.

Speaking on World Water Day, Prof T. G. Sitharam, Director, IIT Guwahati said, “Supply of contaminant free drinking water to the villagers where pipe water

supply scheme from the Government has not yet reached them is a major problem in most of the States of the country, including Assam. The technology adopted here might be useful to the citizens both in rural and urban areas for getting contaminant free drinking water. The initiatives taken by Prof. Mihir Kumar Purkait of IIT Guwahati to supply contaminant-free drinking water to the schools and temples in the remote areas will definitely improve the rural health and fulfil the 6th Sustainable Development Goal.”

Speaking on World Water Day, Prof. M K Purkait, Department of Chemical Engineering, IIT Guwahati said, “Fluoride contamination is a worldwide problem now-a-days. To remove this contaminant from water, a new nano-adsorbent was synthesized by applying a novel nanomagnetite aggregation process through the formation procedure of iron oxide hydroxide, i.e., schwertmannite ($Fe_8O_8(OH)_6(SO_4)$). This is a composite of ferromagnetic and paramagnetic materials as well which improves the fluoride adsorption capacity many fold than that of commercially available in the market. The methodology and details of this nano-adsorbent and its various forms are already published in several international journals of repute.”

This technology is based on the adsorption principle using Nanomagnetite aggregated schwertmannite as an efficient adsorbent developed by Prof. Mihir Kumar Purkait, and his PhD scholar Dr. Aparajita Goswami of the Department of Chemical Engineering, IIT Guwahati, in which harmful pollutants such as fluoride and other contaminants can be removed efficiently.

These water treatments plants are installed as a part of DST (Department of Science and Technology) sponsored project on “Centre for Technological Excellence in Drinking water purification. The centre is virtual in nature within IIT Kharagpur, IIT Guwahati, Jadavpur University, National Institute of Technology Delhi and Indian Institute of Chemical Technology, Hyderabad.

Other than this for over a decade, the Water Quality Research Group of the Indian Institute of Technology Guwahati have played a major role in the rural drinking water sector in Assam. Following a rapid assessment for drinking water quality back in 2005, it was decided to have a partnership to facilitate the Public Health Engineering Department (PHED) in the

successful implementation of sustainable drinking water security in rural areas in Assam. The joint partnership of UNICEF, IIT Guwahati and Public Health Engineering Department (PHED) initiated the Arsenic Screening and Surveillance Program in Assam covering the period 2005-2011. The UNICEF-IITG-PHED partnership was successful in achieving some of the key milestones during the cycle spanning from 2005-2012, and IIT Guwahati was instrumental in bringing in these outcomes,



1. Treatment unit within a room in the school
2. Water reserver behind school
3. IIT Guwahati team at the School



IIT Guwahati and Numaligarh Refinery Limited (NRL) join hands to support Students Start-up

A tripartite incubation support agreement has been signed between IIT Guwahati, Numaligarh Refinery Limited (NRL) - a public sector company, and Vigitrics Private Limited on 17th March 2021. The agreement was signed by Dean (Industrial Interactions & Special Initiatives) IIT Guwahati, Prof. G. Krishnamoorthy, Senior Chief General Manager (Corporate affairs) NRL, Mr Nikunja Borthakur, and Director, Vigitrics, Mr. Pharvesh Salman Choudhary in presence of Director, IIT Guwahati Dr. T. G. Sitharam, other officials of NRL, IIT Guwahati and Vigitrics Private Ltd at IIT Guwahati.

Vigitrics Private Limited, a start-up company aiming to develop Intelligent Drowsiness Detection System, will be incubated at the Technology Incubation Centre of IIT Guwahati (IITG-TIC). The start-up company is funded by NRL through its Start-up Funding Program iDEATION. The start-up was founded jointly by two students from IIT Guwahati and a student from Tezpur University, Assam. The co-founders of Vigitrics Private Limited are Pharvesh Salman Choudhary, Director Mousumi Das, Director and Satyabrat Malla Bujarbaruah, Director.

The company aims to build a low-cost system to detect drowsiness of the driver with multimodal approach. The proposed system is a non-intrusive system used to determine the drowsiness of the driver and to alert the driver if drowsiness is detected. The system developed will continuously evaluate driver's physiological and behavioral parameters to assess the drowsiness level.

IITG-TIC supports such innovative activities through incubation and provide technical mentorship in collaboration with research experts in the field at IIT Guwahati. The agreement was signed in the presence of Prof. Sitharam, Director IIT Guwahati,

who commented, "To enhance the institute-industry collaborations, innovations and entrepreneurship IIT Guwahati established an office of Dean for Industrial Interactions and Special Initiatives (II&SI) in May 2020. I appreciated that this company is founded by students including a girl student of IIT Guwahati through their innovative idea. I also welcome NRL to fund more start-ups from IIT Guwahati. Through this collaboration, both NRL and IIT Guwahati are expecting significant boost in high quality products and provide a foundation for further collaborations resulting in self-sustaining technologies in various fields of mutual interest."



Prof. Sitharam, Director, IIT Guwahati (center) along with the signatories', cofounder of the start-up and dignitaries from NRL and IIT Guwahati.

International Women's day 2021

The International Women's Day was celebrated with great enthusiasm on 8 March 2021 at IIT Guwahati. It started with a welcome address by the ICC Chairperson, Prof. Shakuntala Mahanta, where she emphasized on the UNICEF goals for women for 2021, which has been articulated as "Women in leadership: Achieving an equal future in a COVID-19 world,". The efforts of women and girls around the world in fighting the pandemic has shown how important equality of different genders will be to shape a more equal future while recovering from the ravages of the COVID-19 pandemic. This was followed by a speech by the director Prof. T.G. Sitharam who applauded the strong support shown by the women of IIT Guwahati during the pandemic. He congratulated everyone, especially the women, who supported all the endeavors of IIT Guwahati to fight against the onslaught of the pandemic on the academic curriculum, student departure and return, and in maintaining a smooth functioning of all campus essentials like shops and essentials, and also the frontline workers who carried out their services in the covid centres and elsewhere.

The function included stellar performances of recitation and narration by students Shivani Gupta, Ankur Pandey and Sathish VH. Dr. Kiran Keshavamurthy discussed snippets from a few select novels to show how gender discrimination shapes women's lives and Dr. Rajshree Bedamatta presented a sharp presentation on the liminal lives of front line health workers (who are mostly women) in India.

In a special gesture, this year's programme included a special felicitation programme of those who supported the administration at various stages in fighting the pandemic. The following faculty, staff, student, medical officers and medical staff members were felicitated during the programme:

Prof. Chitralekha Mahanta; Prof. Anamika Barua; Dr. Mahima Arrawatia; Dr. Suresh Resmi; Dr. R Anandalakshmi; Dr. Daksha Parmar; Dr. Mala Borthakur; Dr. Leena Barua; Dr. Pallabi Sarmah; Ms Monalisa Kakati; Ms Amaya Phukan; Ms Manashri M Bordoloi; Ms Deepti Devi; Ms Juna Prabha Devi; Ms Shivani Gupta; Ms Heeramoni Boro; Ms Sunita Deb; Ms Pratibha Maurya; Ms Ila; Ms. Ilabati Das; Ms. Ibansiewlin Rymbai; Ms. Pompei Poddar; Ms. Mili Begum; Ms. Susma Pegu; Ms. Mitali Borah; Ms. Rehana Jannat;

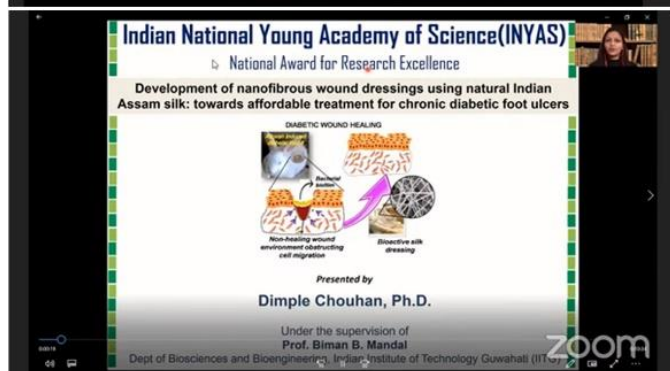
Ms. Bhiolina Das; Ms. Barnali Baishya; Ms. Mira Doley; Ms. Jamuna Kalita; Ms. Munna Kalita and Ms. Rimli Devi

The programme ended with a vote of thanks given by Ms. Monalisa Kakti, Assistant registrar of Faculty Affairs.



Awards and honours

Dr. Dimple Chouhan, student of Prof. Biman B. Mandal of the Department of Biosciences and Bioengineering, IIT Guwahati has won the prestigious "INyas National Award 2020 for Research Excellence: Best Research in Natural Nanofibers with Societal Impact" jointly supported by INSA. The award was given away by Hon'ble Minister Sanjay Dhotre Ji, MoS for Education, Communications, Electronics & IT, GoI the on National Science Day





Awards and honours



Arnab Paul Choudhury, M.Tech. student of IIT Guwahati has been selected as Campus Ambassador by Cisco Systems in IIT Guwahati from March 2021-June 2022. The main goal for this program is to act as a bridge between Cisco and IIT Guwahati.



Prof. Biman B. Mandal, Dept. of Biosciences and Bioengineering IIT Guwahati has been selected as the Editorial Board member of the Journal Biofabrication. This is one of highly cited International peer reviewed journal in this field published by Institute of Physics (IOP) Publishing, UK commanding an Impact Factor of 8.2.



Dr. Biranchi Panda Assistant Professor, Dept. of Mechanical Engineering, IIT Guwahati has receives an invitation to join Editorial Advisory Board from Rapid Prototyping Journal.



Dr. Arun Tej Mallajosyula, Assistant Professor, Department of Electronics and Electrical Engineering, IIT Guwahati has been elected to the grade of Senior Member of EEE



Alexander von Humboldt Foundation has granted Dr. Chandan Kumar, Assistant Professor, Department of Electronics and Electrical Engineering a sponsoring of a renewed research for 3 months, starting 1st May 2021.

Book Release

A book titled "Nanotechnology in Edible Food Packaging: Food Preservation Practices for a Sustainable Future" published by Springer Nature and authored by Prof. Vimal Katiyar and Dr. Tabli Ghosh from the Department of Chemical Engineering, IIT Guwahati, has been released by Professor T. G. Sitharam, Director, IIT Guwahati on March 24, 2021.

The book collection highlights the use of nanotechnology based edible food packaging directing young researcher and industrialist to gather a wide-spectrum of knowledge in edible food packaging sectors, which is an indispensable area in present global food packaging market.

In the current scenario, the increased ecological pollution due to conventional food packaging systems are held by raising carbon footprint, amplified non-degradable solid waste generation, which has raised a concern in developing environment benign edible polymer-based packaging system from naturally available resources with strategical modifications. The edible food packaging system as edible coatings and films are a remarkable candidate in reducing food waste generation with respect to techno-socio-economic aspects.

In this context, this is the first book addressed to provide nanotechnology assisted edible food packaging systems to deal with the existing problems. Firstly, the book delivers systematic overview of current global overview of edible food packaging in terms of market analysis and research and development sections, history outline, and others. Additionally, the book mainly confers to nanotechnology assisted edible food packaging with an in-depth discussion on associated bionanostructures, fabrication strategies, multiphase system, protocols for materials development, multifarious packaging technology and other magnificent areas.



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