

INDIAN INSTITUTE OF TECHNOLOGY
DELHI, NEW DELHI



PROF. T. K. GHOSE MEMORIAL AWARD 2024

Department of Biochemical
Engineering and Biotechnology
IIT Delhi



Contact Us
011-2659-1001



More Information
<https://beb.iitd.ac.in/>

03:30 - 06:00 PM

30
SEPTEMBER
2024

**LECTURE HALL
COMPLEX
LH-121**

PROGRAMME



September 30, 2024 (Monday)

Venue: Lecture Hall Complex - 121

EVENT HIGHLIGHTS

Time (IST)

03:30 PM	Prof. Ritu Kulshreshtha, Head DBEB Introduction to the Memorial Award
03:45 PM	Prof. V.S Bisaria, (PhD, IIT Delhi, 1978) Reminiscences about Prof. Ghose
03:50 PM	Prof. Ashok Kumar Dubey (PhD, IIT Delhi, 1988) Reminiscences about Prof. Ghose
03:55 PM	Prof. Prashant Mishra Introduction to the Awardee
04:00 PM	Dr. Soumya Rajpal - Awardee Rational Design and Molecular Engineering of Synthetic Receptors for Biomarker-Based Pathogen Detection
04:15 PM	Prof. Samresh Das Introduction to the Awardee
04:20PM	Dr. Sumit Sharma - Awardee Field Effect Transistor-based Biosensor Development for Real-time Sensing Application
04:35 PM	Introduction to the Speaker (Prof. TK Ghose Memorial Lecture)
04:40 PM	Prof. Rakesh Bhatnagar, National Science Chair, School of Biotechnology, Jawaharlal Nehru University, New Delhi Development of Genetically Engineered Vaccine against Anthrax
05:10 PM	Vote of Thanks
05:15 PM	High Tea

PROF. T.K. GHOSE ENDOWMENT



<https://unlimiitd.iitd.ac.in/research/prof-t-k-ghose-endowment/>



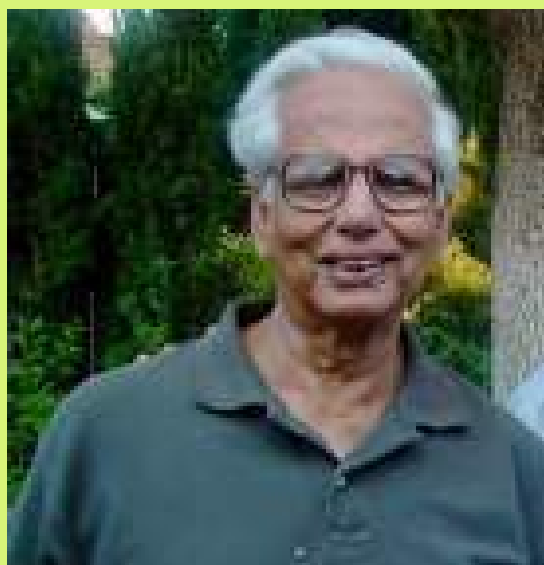
Prof. Tarun Kumar Ghose

He was the initiator of Biotechnology and Biochemical Engineering research in India. Born on Sep 01, 1924, in West Bengal, he got a doctorate in Science from ETH, Switzerland. He held Professorship in Jadavpur University (Kolkata), HBTI Kanpur and IIT Delhi. He worked with many world renowned scientists from US Natick Lab to France, Switzerland, Australia, Russia, Japan, Brazil, Germany, Poland, Sweden, Spain, Italy, Singapore, etc. He founded Biochemical Engineering in India and chaired the department in IIT Delhi until 1985. He inspired huge number of graduate students, teachers and bio-industry professionals in the field of Biotechnology, Bioprocessing and Biofuels for about five decades, until his last day Sep 24, 2019.

The Prof. T.K. Ghose Memorial Award for Best PhD Thesis in Biochemical Engineering and Biotechnology was instituted in the year 2021 and is administered by the Office of Alumni Relations. This is supported by an endowment created from donations by the erstwhile colleagues and students of Prof. T.K. Ghose.

ABOUT THE AWARD

Prof. T.K. Ghose Memorial Award for Best PhD Thesis in Biochemical Engineering and Biotechnology



About

The Award aims to recognize a student of IIT Delhi whose PhD thesis in Biochemical Engineering and Biotechnology has been adjudged to be the best in that particular year.

Eligibility Criteria

All students who have completed their PhD thesis (including oral defence) in the area of Biochemical Engineering and Biotechnology in the year preceding July 31 of a given year will be eligible for consideration that year.

Selection Process

A selection committee constituted by the Head DBEB, comprising external experts and a nominee of the donors selects the awardee.

Value of the Award and presentation

An amount of Rs 50,000 is awarded as the 'Prof. T. K. Ghose Memorial Award for Best PhD Thesis in Biochemical Engineering and Biotechnology'. In case of joint awardee the amount of Rs. 50000 is equally distributed between the awardees. The award is presented at a ceremony organised by DBEB following the annual convocation of the Institute.

PROF. T.K GHOSE BEST PHD THESIS AWARDEE



Dr. Soumya Rajpal

Ph.D. Department of Biochemical Engineering and
Biotechnology

Current Position: Post Doctoral Researcher
Institute of Analytical and Bioanalytical Chemistry Ulm University,
Germany



in recognition of her impactful research in biotechnology, focusing on the development of novel materials that drive progress in healthcare and beyond. Her work combines sophisticated computational techniques with practical design to create synthetic receptors and artificial antibodies, enhancing the efficiency of detection tools. Dedicated to turning research into real-world solutions, she is committed to technology transfer and bringing innovative biotechnologies to market, aiming to make a significant global impact.

Rational Design and Molecular Engineering of Synthetic Receptors for Biomarker-Based Pathogen Detection

Imagine a world where diagnostics no longer relies on fragile, costly antibodies. Enter molecularly imprinted polymers (MIPs)—synthetic materials with the potential to outlast, outperform and outmaneuver traditional diagnostic tools. MIPs can bring unmatched stability and flexibility, engineered to recognize almost any biomolecule with precision, making them the future of diagnostics. By leveraging advanced computational techniques, MIPs can be fine-tuned at the molecular level to mimic antibodies, unlocking possibilities for rapid, accurate and scalable diagnostics. As the demand for efficient healthcare solutions grows in the face of global challenges like antimicrobial resistance and emerging pandemics, MIPs offer a transformative alternative that promises to reshape how diseases are detected and managed. This isn't just an upgrade—it's a revolution in diagnostics and MIPs are leading the charge!!!

PROF. T.K GHOSE BEST PHD THESIS AWARDEE



Dr. Sumit Sharma

PhD, Centre for Applied Research in Electronics (CARE)

Current position: Research Associate at CARE IIT Delhi



Dr. Sumit is a highly accomplished researcher with a Ph.D. from the Centre for Applied Research in Electronics at the Indian Institute of Technology Delhi. His research primarily focuses on the development of cutting-edge semiconductor devices and sensors, specializing in micro/nano-electronics. Sumit has demonstrated expertise in fabricating silicon-based transistors and biosensors, utilizing advanced materials such as metal oxides and 2D materials. His work has significantly contributed to the field of biosensor development, particularly in fabricating field-effect transistor (FET) biosensors for sensitive analyte detection in biological samples. Sumit has been recognized for his achievements, earning the Best Poster Award at an international conference on 2D materials devices for biological application and the NRF Research Scholar Award at IIT Delhi. His research, with several peer-reviewed publications, conference presentations, and patents, is distinguished by its practical applications in health diagnostics and environmental monitoring.

Field Effect Transistor-based Biosensor Development for Real-time Sensing Application

The use of biosensors for early-stage disease detection and disease prognosis is becoming more and more popular every day. Among the different available biosensing platforms, Field Effect Transistor (FET) based sensors are the most popular nowadays for their various applications. The FET-based biosensors offer the advantage of high sensitivity, low concentration of analyte detection, real-time sensing capability, quick response, and, most importantly, ease of integration with the integrated circuits (ICs). The wide usability of FET biosensors lies in the variable working characteristics, such as working in chemical and physical mediums and the variety of materials that are available for its fabrication. FET-based biosensors have the possibility of scalability and commercialization because they follow standard complementary metal-oxide semiconductor (CMOS) compatible fabrication process steps. The developed biosensors exhibited real-time detection capabilities for key biomarkers associated with liver diseases and oral cancer diagnoses, such as ammonia, hydrogen sulfide, and CYFRA 21-1 antigen. This work majorly focuses on the development of highly sensitive biosensors based on the FET technology for saliva and plasma-based biomarker detection on a real-time basis and the prospects of their batch fabrication.

PROF. T.K GHOSE MEMORIAL AWARD LECTURE



Professor Rakesh Bhatnagar



**Professor
Ph.D.**

**FNA, FASc, FNASc, JC Bose National
Fellow**

**President of India Awardee for Best
Innovation**

**National Science Chair, School of
Biotechnology, Jawaharlal Nehru University,
New Delhi**

Prof. Rakesh Bhatnagar is a scientist par excellence and institution builder and a renowned academic leader of the country. Currently, he is serving as the National Science Chair at Jawaharlal Nehru University, which has been bestowed to him by the DST, Ministry of Science and Technology, Government of India.

Prof. Bhatnagar pursued his Ph.D. from the Department of Biochemistry, National Sugar Institute, Kanpur followed by working in Freiburg University, Germany, University of Caen, France and NIH & USAMRIID, USA. He pioneered the teaching of Biotechnology at the Jawaharlal Nehru University, the first of its kind in the country. Prof. Bhatnagar is well known for developing recombinant vaccine against anthrax. This technology has been transferred to the industry.

Prof. Bhatnagar (a former Vice Chancellor of Banaras Hindu University, Kumaun University, Nainitaland Amity University Rajasthan, Jaipur) in addition to being J. C. Bose Fellow, is an elected Fellow of all three major Science Academies of India namely Indian National Science Academy, New Delhi, Indian Academy of Science, Bangalore, National Academy of Science, Allahabad. He has ~200 research papers to his credit, his publications have received >6000 citations, >50 h-index and >120 i10-index. He has supervised more than 50 Ph.D students. Prof. Bhatnagar's research has been ranked 7th (The first six were from Pasteur Institute, Harvard Medical School, NIH and USAMRIID) in the anthrax research globally. Recognizing with extraordinary contribution in the field of research and innovation he has been awarded with many prestigious awards and recognition few of them are President's Award for Best Innovation by President of India, ICMR Award for Outstanding research work in the field of Immunology by ICMR.

Prof. Bhatnagar has served the Jawaharlal Nehru University at various important positions like Chairperson, Director and Dean. Because of his efforts School of Biotechnology has been ranked at No.1 biotechnology teaching programme in the country consistently. He has also established a world class Biological Safety Laboratory Level III.

PROF. T.K GHOSE MEMORIAL AWARD LECTURE



Professor Rakesh Bhatnagar



**Professor
Ph.D.**

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Lecture on Development of Genetically Engineered Vaccine against Anthrax

The nature of bio-terrorism resulting from an anthrax attack is such that an aggressor is likely to strike at a time and place calculated to induce maximum terror through mass casualties. The currently recommended post exposure treatment is a combination of an antibiotic (ciprofloxacin) and a licensed human vaccine AVA (highly toxic with side effects). Therefore, we have PCR-cloned and overexpressed the anthrax protective antigen gene. Bioprocess optimization was done to improve the yields of the genetically engineered protective antigen. The total yield of genetically engineered vaccine obtained was 25 g from a 5-liter bioreactor, which is equivalent to 1 million shots. The genetically engineered protein was found to be functionally and biologically identical to its *Bacillus anthracis* antigen. Toxicity studies conducted on this protein indicated that the protein is devoid of any toxicity and can be safely used for the development of a safe and effective genetically engineered vaccine against anthrax. Clinical trials have been successfully as per guidelines of Drug Controller of India and US FDA. Technology for making genetically engineered vaccine against anthrax has already been transferred to a company for post exposure therapy, a bispecific therapeutic antibody has been developed to neutralize lethal and edema factor. This antibody is able to treat anthrax in animal model. Humalized version of this antibody alongwith antibiotics is currently being developed for post exposure therapy for unimmunized human anthrax victims.



Department of Biochemical Engineering and Biotechnology
Indian Institute of Technology Delhi
Hauz Khas, New Delhi 110016

Tel: +91-11-26591001, 26596109

Email: hoddbeb@iitd.ac.in

Website: <https://beb.iitd.ac.in/>

