Professor M. Santappa Award Lectures - 2020

AWARD LECTURE 1

Biodegradable Smart Polymer Nanocomposites as a Sustainable Material for Multifaceted Advanced Applications

by

Prof. Niranjan Karak

Tezpur University

Date: November 02, 2022 | Time: 11.45 am

Venue : MACRO-2022 at CSIR-NCL Pune Auditorium

CSIR-NCL, Pune

AWARD 2

by

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Gharda Chemicals

Organized by:

The Society for Polymer Science, India

AWARD LECTURE 1

Abstract

Sustainability is a requirement for today's society and polymeric materials are not an exception of it. Conventional petroleum-based polymers are mostly non-biodegradable and obtained from non-renewable fixed resources. Thus, it is essential to develop bio-based sustainable biodegradable polymeric products with desired performance to fulfill the demand of an everincreasing world population and comfort in human life on one hand, and reduction of fossil fuel reserves, global warming, climate change, and stringent environmental rules and regulations on other hand. In this endeavor, the author's group has tried to exploit naturally renewable resources as feedstocks for the development of desired polymers with required biodegradability. Hence, a few industrially important bio-based polymers such as polyurethanes, polyesters, poly(ester-amide)s and epoxies have been developed using different naturally renewable bio-resources. These polymers have been synthesized by using the dictates of Green Chemistry. Recently, modified natural polymers have also been utilized. But, to achieve the desired performance of such bio-based polymers and to address the societal demands of advanced applications, a variety of nanocomposites by incorporation of different types of nanomaterials from zero to two including one-dimensional have been investigated. The developed nanocomposites showed significant improvement of mechanical, thermal, chemical, biological, optical, electrical, catalytic, etc. along with special properties like antimicrobial, antistatic, fluorescent, shape memory, self-expandability, self-healing, selfcleaning, biocompatibility, etc., depending on the special features of the used nanomaterials. A brief overview of all such studies including their applications from active surface coating to smart biomedical including structural materials will be discussed at this event.

References

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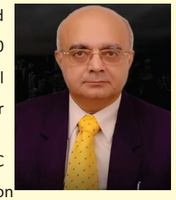
About the speaker

Niranjan Karak, FRSC (London), M.Sc., M.Tech., Ph.D. (IIT Kharagpur) is Dean, Research and Development of Tezpur University (TU) and a Professor of Polymer Science and Nanomaterials, Chemical Sciences Department (former HoD) and former Head, Sophisticated and Analytical Instrumentation Center of TU. Prof. Karak also served as a Post-doctoral Fellow at the Korean Advanced Institute of Science and Technology and Visiting Professor of Prof. J. W. Cho's Laboratory, Konkuk University, South Korea, as well as a Guest Researcher at the Leibniz Institute of Polymer Research, Germany. He has 25 years and 3 months of academic experience and one year of industrial experience.

Dr. Karak has published 250 research papers including review articles in journals and presented numerous invited talks in India and abroad. He is also authored five books and edited three books. He has also written twenty chapters in edited books. His works are well-cited (h-index = 55, i10-index=203, citation= 10471, Google scholar as of June 6, 2022).

AWARD 2

About the Awardee



Dr. Prakash Trivedi, has expertise in polymer science, and heads the SBU Polymers at Gharda Chemicals. With over 40 patents, 50 technical publications, and 90 global presentations, he has significantly contributed to polymer innovation.

Author of Specialty Thermoplastics and co-author of PVC Technology, Dr. Trivedi is also penning down a monograph on polymer production technology. He has been recognized with the Prof. M. Santappa Memorial Award, Lifetime Achievement Award by IPI, and Distinguished Alumnus Award by ICT. An adjunct professor at ICT and Fellow of IPI, Dr. Trivedi remains a prominent figure in advancing polymer technology and sustainable chemistry.

About Professor M.Santappa

Mushi Santappa born on October 2, 1923, obtained his BA (Chemistry) in 1943 from the University of Madras. He did his MSc (Chemistry) in 1946 from Banaras Hindu University. He obtained PhD (Organic Chemistry) in 1949 from University of London under the guidance of R.W. West followed by a second PhD (1951) in 'physical chemistry of high polymers' from Manchester University. Upon his return to India he joined the University of Madras (1952) as a Reader in Physical Chemistry and became a Professor in 1958. He served as Director, Central Leather Research Institute (CSIR-CLRI) from 1972-78. Subsequently he served as Vice-Chancellor of SV University, Tirupathi (1979-81) as well as the University of Madras (1981-84). He was conferred honorary DSc from Andhra, Madras, Sri Krishna Devaraya and Madurai Kamaraj Universities and honorary DLitt from Gulbarga University.

Professor Santappa published over 350 papers in peer-reviewed journals and guided 59 PhD students. He was awarded the S.S. Bhatnagar Prize for Chemical Sciences (1967), the Sir JC Ghosh Memorial Medal of Indian Chemical Society (1982), and the FICCI Award for Science and Technology (1985). He was elected Fellow of the Indian Academy of Sciences, Bangalore, National Academy of Sciences (India), Allahabad and the Indian National Science Academy, New Delhi.

Professor Santappa was initiated into the study of kinetics of vinyl polymerization as a PhD student working with Professor Meredith G. Evans, FRS (1904-1952) at the University of Manchester in the years between 1948 and 1951. Professor Evans, an early pioneer in the study of chemical kinetics, turned to the study of electron transfer reactions involving ferrous ions and hydrogen peroxide (Fenton reagent) and their ability to polymerize methyl methacrylate in aqueous emulsions Professor Evans elucidated the kinetics and mechanism of this reaction and further proposed that UV and visible light can promote internal electron transfer and, thus, vinyl monomers can be polymerized under the influence of light (photo polymerization). Professor Santappa's PhD work concerned photo-initiated free radical polymerization of vinyl monomers. Upon his return to India Professor Santappa built an active school of research on the study of kinetics of vinyl polymerization. Beginning in 1955 he published a series of over 150 papers on kinetics and mechanism of vinyl polymerization and determination of initiation rates and chain transfer constants for a host of initiators and vinyl monomers. Along with Professor Santi R. Palit at the Indian Association for the Cultivation of Science, Professor Santappa, established the first rigorous school for polymer science research in India and trained a whole generation of polymer chemists who went on to practice the discipline with great distinction. Professor Santappa brought great visibility to Indian polymer research for about three decades. In 1983, he organized India's first ever IUPAC sponsored International Symposium on Polymers at Madras (Chennai). In 1996 he authored a book which comprehensively reviewed the status of polymer science in India

About Professor M. Santappa Award

The Award was instituted by the Society for Polymer Science, India, in 1988 to honour Professor Mushi Santappa, a distinguished physical chemist and a pioneer in polymer science research in India. Professor Santappa was the founder of the Department of Physical Chemistry, University of Madras. Under his dynamic leadership and erudite scholarship, the Department became of hub of polymer science research in the period 1952-1970.

The award is given biennially by the Society to distinguished scientists for outstanding research contributions made in India during the ten years preceding the year of the award in the field of Polymer Science.

Prof. Santappa Award Winners of The Society for Polymer Science, India

1988 Dr. V. M. Nadkarni, National Chemical Laboratory, Pune
1988 Dr. S. Sivaram, National Chemical Laboratory, Pune
1991 Prof. Ashok Misra, Indian Institute of Technology, New Delhi
1998 Prof. B. M. Mandal, IACS, Kolkata
2004 Prof. A.K.Nandi, IACS, Kolkata
2006 Dr. C. P. Raghunadan Nair, VSSC, Thiruvananthapuram
2006 Dr. P. P. Wadgaonkar, National Chemical Laboratory, Pune
2010 Dr. Pralay Maiti, Banaras Hindu University, Varanasi
2014 Dr Nikhil K. Singha, Indian Institute of Technology, Kharagpur
2017 Prof. Giridhar, Madras Indian Institute of Science, Bangalore
2018 Prof. Tarun K. Mandal, IACS, Kolkata, India