

# Fifth Palit Memorial Lecture 2025

## My Fascinating Encounters with Hyperbranched Polymers

by  
**Prof. S. Ramakrishnan**  
Indian Institute of Science  
Bangalore

Date: December 17, 2025  
Time: 10:10 am to 10:40 am

Venue: MACRO-2025 at Staudinger Hall  
IIT Kharagpur Research Park, Newtown, Kolkata

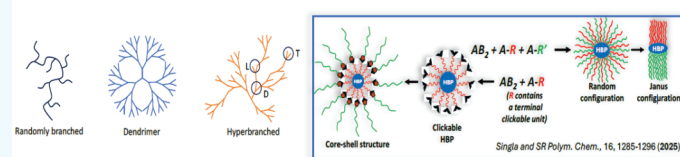
Organized by:



### Abstract

In 1990, my first PhD student and I began working on a then relatively new class of polymers, namely Hyperbranched Polymers (HBPs), that were architecturally very distinct from simple linear polymeric chains and therefore were expected to exhibit several unusual properties, some of which had been seen in their structurally perfect congener, namely Dendrimers;<sup>1</sup> the area clearly presented numerous synthetic possibilities, structural variations and functional properties, all of which excited us. However, little did I imagine that my fascination with this class of polymers would last so long, that my last PhD student is utilizing HBPs to develop unique multi-domain crosslinked polymeric materials in order to understand the impact of subtle structural features on their mechanical behavior.

Although our lab's research efforts strayed into several other interesting and rewarding areas, HBPs remained a unique and interesting thread that strung my academic career. For the Professor S R Palit Memorial Lecture, I will explore the question: what is it that kept me glued to area of HBPs? My talk will discuss a few fascinating snippets of some early unique revelations about HBPs and develop a story that would bring us to the most recent interesting discoveries that we made and are continuing to explore. Some of the recent findings that I will cover concern Janus amphiphilic HBPs,<sup>2</sup> Core-shell HBPs,<sup>3</sup> amphiphilic hydrogels,<sup>4</sup> single-ion conductors, and so on.



### References:

1. A. K. Gayen, R. Singla, S. Ramakrishnan, Chem. Commun., 2024, 60, 1534-1545.
2. R. Singla, E. B. Gowd, S. Ramakrishnan, Polym. Chem., 2025, 16, 1285-1296.
3. R. Singla, S. Ramakrishnan, Polym. Chem., 2025, 16, 4240-4249.
4. A. K. Gayen, S. K. Perala, D. Schauenburg, T. Weil, S. Ramakrishnan Chem Asian J., 2023, 18, e202300143.

### About the speaker

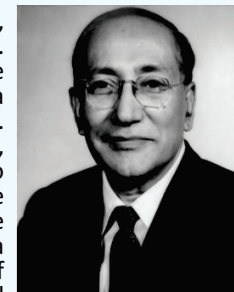
Subramaniam Ramakrishnan is an Indian polymer chemist, a professor at the Department of Inorganic and Physical Chemistry and the designer at the Macromolecular Design and Synthesis Group of the Indian Institute of Science. He is known for his studies on design and synthesis of controlled polymer structures and is an elected fellow of the Indian Academy of Sciences. The Council of Scientific and Industrial Research, the apex agency of the Government of India for scientific research, awarded him the Shanti Swarup Bhatnagar Prize for Science and Technology, one of the highest Indian science awards, in 2005, for his contributions to chemical sciences.

He graduated in chemistry from the SIES College of Arts, Science & Commerce of Mumbai University in 1980. He joined the Indian Institute of Technology, Bombay to complete his master's degree in 1982. Moving to the US, he secured a PhD from the University of Massachusetts, Amherst in 1988, working under the guidance of J. C. W. Chien, and did his post-doctoral studies at the Corporate Research Laboratory of the Exxon Research and Engineering Company, New Jersey during 1988-90. Returning to India, he started his career at the Indian Institute of Science the same year as a lecturer where he heads the Macromolecular Design and Synthesis Group as the chief designer. During his tenure at the IISc, he held the positions of an assistant professor (1993-99) and an associate professor (1999-2005) before becoming a professor of the department of Inorganic and Physical Chemistry in 2005. In between, he had two stints abroad, first as a visiting scientist at the University of Florida (2000) and the next, as a Philips Visiting Professor at Eindhoven University of Technology (2001). Prof. Ramakrishnan also served as the deputy director at the Indian Institute of Science (2017-2019).



### About Prof. S.R. Palit

Prof. Santi Ranjan Palit was born in Calcutta on 24th March, 1912. In 1931, he came out first in First Class in the B.Sc. examination and the same performance was repeated in the MSc. examination in Pure Chemistry of the Calcutta University. The next two years after passing the MSc. examination was a period of agony of joblessness to him, since his mother (a follower of Mahatma Gandhi) opposed to allowing his son joining any Government service under the then British Government. At long last, it was through the intermediary of Dr. Shyama Prasad Mukherjee that he got a research fellowship at the Department of Pure Chemistry of Calcutta University under Prof. J. N. Mukherjee, (a renowned colloidal chemist) and published his first paper in 1933 on cataphoretic speed of colloid particles. But he left it after one year to join the Vidyasagar College as lecturer where he spent two years and then wrote a book on Elementary Physical Chemistry. In 1938, he joined the Lac Research Institute, Ranchi as a Research Assistant under Dr. H. K. Sen where he got exposed to the fascinating world of paints, varnishes, lacquers etc. The first paper on Cosolvency came out from there in 1940 and subsequently he received P. R. S and D. Sc degree of Calcutta University. Prof. Mc-Bain of the University of Stanford, California invited him to search solvents for soaps and in early 1945, he joined in McBain's laboratory working as a Bristol-Meyer Research Associate. Prof. McBain had a great admiration to him quoting "Palit has a special ability to look at a familiar thing from an unfamiliar angle". After that he started to work with Prof. Herman Mark at the Polymer Institute at Brooklyn as a part-time researcher after a full time service at the research laboratory of E. F. Drew & Company, a leading manufacturer of oil derivatives. He then started the work on cosolvency of high polymers and made vast experience on the rapidly developing branch of Polymer Science. On the basis of work done there he was given the P.R.J.C award. Mention may be made of two very successful co-workers of him at that time, who was Bruno Zimm, famous for Zimm plot and Turner Alfrey.



In 1947, amidst the climax of dawning independence, he came back to India. At that time Prof. Meghnad Saha, the then President of the Indian Association for the Cultivation of Science (IACS) was organizing the association in a new and promising manner befitting a leading research centre with emphasis on high polymers. Immediately, he appointed S. R Palit first as a planning officer and then as a Professor of Chemistry. Thus started the Physical Chemistry Department of the I.A.C.S. housed in a single room and a verandah of the then dilapidated premises at 210 Bowbazar Street, Calcutta. At 1950, IACS shifted to Jadavpur where he made a good school of polymer and physical chemistry. Regarding the Professor's activities on polymers, it will not be irrelevant to quote Prof. Herman Mark:" ..... during his (Palit's) activities at his institute in Calcutta he (Palit) developed into the leading polymer scientist in India and in fact, the most prominent representative of this discipline in the far East. His numerous publications and his successful and convincing delivery of many lectures at International Conferences continued to increase his reputation and made him to become a recognized member of the small group of leading polymer scientists in the entire world". He worked as a Guest Professor in Berlin 1965-66 and in 1966, he was a Visiting Professor at the University of Florida, USA. He became a fellow of the Indian National Science Academy (F. N. A) and a fellow of the Indian Academy of Sciences (F. A. Sc.). Number of successful doctoral students guided by Prof. Palit till 1975 was 80, but he stayed at IACS as Emeritus Professor till 1981 and guided about another 20 students His last three students were awarded the degree in 1980-1981. He published more than 300 papers, monographs etc and his most important contributions are particularly polymerization kinetics including chain transfer and dye partition techniques for detection of polymer end groups, (ii) Anomalous (non-Faradaic) electrolysis, nonaqueous titration etc. He died on 14 th August 1981 at Calcutta after his coming back immediate from London delivering/demonstrating a talk on non-Farady electrolysis at Royal Society keeping a group of eminent polymer scientists working both in academic and industry in the country.

The fund for Prof. S.R. Palit award of SPSI has been raised by members of Kolkata Chapter from the organization of national (Polymer-2006) and International (Macro-2015) conferences at IACS, Kolkata.

### Earlier Lectures

- 2017: Professor Sadhan C. Jana, University of Akron, Akron, Ohio, USA.
- 2018: Professor Chi Wu, The Chinese University of Hong Kong.
- 2020: Professor Yves Gnanou, KAUST, Thuwal, Saudi Arabia
- 2023: Prof. S. Thayumanavan, University of Massachusetts, Amherst