Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Development of Novel Tools for Chemical Protein Synthesis and Modulating Protein Tertiary Structures

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Proteins, fundamental components of life, are naturally synthesised within cells by ribosomes. In contrast, chemical protein synthesis employs techniques such as solid phase peptide synthesis and native chemical ligation, which rely on organic chemistry principles to achieve precise modifications of protein backbones and side chains, surpassing the capabilities of biological systems. Recent advancements in chemical protein synthesis methodologies have empowered researchers to design and engineer proteins with unprecedented precision, facilitating remarkable possibilities in drug discovery. However, some of the available chemical protein synthesis methods are still less-efficient and use toxic reagents. In my presentation, I will discuss novel approaches that simplify chemical protein synthesis to a larger extent, including the development of more efficient catalysts for native chemical ligation and new one-pot chemistries to enhance its efficiency, showcasing their successful application in the total chemical synthesis of multiple proteins. I will also discuss the use of non-canonical amino acids as tools to stabilise tertiary structures of various proteins, proposing that an expanded set of amino acid building blocks can provide novel solutions to evolutionary challenges.

Monday, Dec 22nd 2025

11:30 Hrs (Tea / Coffee 11:15 Hrs)

Auditorium, TIFRH