

# Inter-IISER Chemistry Meet (IICM 2017)

## Supramolecular Catalysts for Chemical Evolution

Dibyendu Das\*

Department of Chemistry, Indian Institute of Science Education and Research Tirupati  
Mangalam, Karkambadi Road, Tirupati 517 507, Andhra Pradesh  
(e-Mail: [ddas.chem@gmail.com](mailto:ddas.chem@gmail.com); [dasd@iisertirupati.ac.in](mailto:dasd@iisertirupati.ac.in))

### Abstract:

There remain critical gaps in our understanding of the emergence of functional biopolymers in the origins of Earth's biosphere. These knowledge gaps include a more detailed understanding of the roles of polymer synthesis, morphological assembly and feedback function, all functioning within mutualistic biopolymer networks that achieve progressive open-ended evolution. Extant proteins, evolved over millions of years, carry out an impressive array of responsibilities, from catalysis and molecular recognition to motility and compartmentalization.

One of the prime objectives of our lab is to investigate the possible origin of these advanced proteins from folds of short peptides. Furthermore, as recent phylogenetic analyses<sup>1</sup> have hinted towards independent protein evolution, we propose to find out a synergistic functional co-assembly between peptide and nucleic acid fragments which can template phosphodiester bond formations, hence setting the stage for functional biopolymer collaboration. Looking beyond, simplicity of preparation of these hybrid nanostructures coupled with the design flexibility has already started to unearth materials adaptable for industrial applications.<sup>2,3</sup> Through this talk, I will encompass the above concepts through the prism of the results from my group where we are currently witnessing a remarkable overlap of self-assembled soft materials, nanomaterials and 2D materials with the worlds of biology.<sup>2-5</sup>

### References

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