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Abstract

Supramolecular Chemistry: New Dimensions of Chemistry on the Nanoscale

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Abstract:

Machinery of life was developed biologically in long-term evolutionary processes, and there is no protocol about the experiments, which finally succeeded. Chemists have been successful with synthesis, isolation and analysis but not with the reproduction of the working molecular apparatus. The introduction of supramolecular self-assembly approach as an engineered phenomenon allowed us to address one of the great challenges on nanoscale level – the separation, containment and manipulation of individual molecules and allow studying molecular interactions, which would make it possible to answer some simple biological questions experimentally on nanoscale level, which are difficult to approach in complex biological modules.

Supramolecular chemistry offers a paradigm shift for fundamental chemical research through hybridisation of organic, physical, inorganic, theoretical and biological sciences that focused on the development of emerging technologies for creation of functional material.1 For supramolecular self-assembly and self-organization of small organic molecules, new synthetic strategies are employed, whereby designer building blocks self-associate in a predictable fashion to form cutting edge materials.

As a part a more diverse research program within our group in supramolecular chemistry, my team have been exploring new approaches to combating several unanswered questions in sciences. For example:

1) Can small molecules are sensitive and selective enough for sensing applications?

2) Are small molecules a valid approach for development of luminescent material?

3) Can the Photosynthetic Reaction Centre (PRC) effectively mimicked by synthetic systems for energy transduction?

4) Are small molecules a valid approach for molecular electronics?

In this presentation, I will highlight the work of my team based on small organic molecules and present their achievements in relevant fields.2-4 This talk will focus on discussion of innovative and cutting-edge research program on smart functional material on the nanoscale level and their applications such as molecular recognition, environmental (purification, separation), energy (solar cells), and drug delivery.

Biography:

Sheshanath V. Bhosale was born in 1976 in Indral Tq. Deoni, completed his M.Sc. in chemistry from the Maharashtra Udaygiri Mahavidyalaya, Udgir (S.R.T.M.U. Nanded) in 1999. He then worked as a project assistant at NCL, Pune, before moving to the Freie University Berlin, Germany, where he received his Ph.D. (Magna Cum Lauda) in supramolecular chemistry under the supervision of Prof. J. H. Fuhrhop in 2004.

Publication of speakers:

1. Chemistry of naphthalene diimides; SV Bhosale, CH Jani, SJ Langford.
2. Photoproduction of proton gradients with π-stacked fluorophore scaffolds in lipid bilayers; S Bhosale, AL Sisson, P Talukdar, A Fürstenberg, N Banerji, E Vauthey.
3. Functional naphthalene diimides: synthesis, properties, and applications; M Al Kobaisi, SV Bhosale, K Latham, AM Raynor, SV Bhosale.

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