Abstract:
In biological systems enzymes catalyze reactions that lead to a selective function in a living system. Such a selectivity is possible because the dimensions of the substrate and the active site of the enzyme are comparable. The active site of an enzyme not only confines the reactant with the aid of multiple strong/weak forces but also pre-organizes the reactive site of the substrate in a selective fashion to afford the single product.Understanding the importance of confinement and weak forces is essential to mimic such a process in a chemistry laboratory. In this context I have carried out photochemical studies in water-soluble deep cavity cavitand and dendrimers that solubilize hydrophobic molecules in water. Such studies not only enable us to achieve selectivity in reactions but also help us carry our reactions in environmentally benign manner. Water-soluble deep cavity cavitand, octa acid, forms dimeric capsular assemblies upon interacting with organic guest molecules in water. Spectroscopic techniques, such as, NMR, EPR and photophysical were used to probe the complexation and dynamics of host-guest assemblies. Photochemical and photophysical studies of these complexes were pursued with the goal of manipulating the excited state processes of guest molecules enclosed in a capsule. Photophysics of thioketones within the octa acid capsular assembly and communication between incarcerated guest molecules and free guest that resides in the bulk aqueous solution will be highlighted in this presentation.

Phloroglucionol based poly(alkylarylether)dendrimers has been synthesized by following a divergent methodology. The endo- and exo-receptor properties were studied, to assess the physico-chemical behavior of these new dendritic macromolecules. Studies of lithiations and electrophilic additions on dendritic structure and also other exo-receptor properties concerning with geometrical isomerism were performed. In addition, endo-receptor properties were studied utilizing the microenvironmental properties of higher generation dendrimers. Thus, fundamental studies were conducted to establish chemical and photochemical studies in dendritic microenvironments.

BIO:
Dr. Nithyanandhan Jayaraj received his PhD from the Department of Organic Chemistry, Indian Institute of Science, Bangalore, India in 2006 under supervision of Prof. N. Jayaraman. Subsequently, he joined Prof. V. Ramamurthy's lab at Department of Chemistry, University of Miami, USA to pursue his post-doctoral research in the area of Supramolecular Photochemistry.