S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Chemical and Biological Sciences

04th February,2025 **4.00 PM** **ONLINE / FERMION**

SPEAKER

Dr. Shilpi Kushwaha, PhD, Fulbright Fellow,
Scientist, Analytical & Environmental Science Division &
Centralized Instrument Facility,
CSIR- Central Salt & Marine Chemicals Research Institute,
Bhavnagar, Gujarat, India.

Short bio :

Dr. Shilpi Kushwaha is working in CSIR-CSMCRI as a senior scientist. She has earned her PhD in Chemistry from the M. S. University of Baroda in 2012. Later she received the Fulbright Post-Doctoral Scholarship in 2013 to work at Biodesign Institute Arizona State University, Tempe, Arizona, USA. She has received the DST-Young Scientist during 2015-2018 and worked in Organic Chemistry Division of CSIR-National Chemical Laboratory, Pune. She has joined CSIR-CSMCRI as scientist in 2018 and received the CSIR-Young Scientist Award in the Earth, Atmosphere, Ocean and Planetary Sciences in 2021, for her work on Extraction of Uranium from secondary sources such as seawater and acidic effluents using crystalline thin films and polymeric nano-rings.

Her core expertise is in chemistry, and it is focused on synthesis of function specific small organic molecules, hydrogen-bonded organic frameworks, supramolecular self-assemblies & woven materials. Currently their lab is progressing in transforming molecular materials to nano-materials (2D sheets, fibers, rings, spheres, thin film etc), and utilizing them in separation science i.e. uranium extraction via adsorption/ molecular sieving via size-exclusion/diffusion, and catalysis by doing small molecule activation. She has published ~35 publications in high impact journals and few patents to her credit.

Harnessing Advanced Self-Assembled Porous Materials in Sustainable Applications

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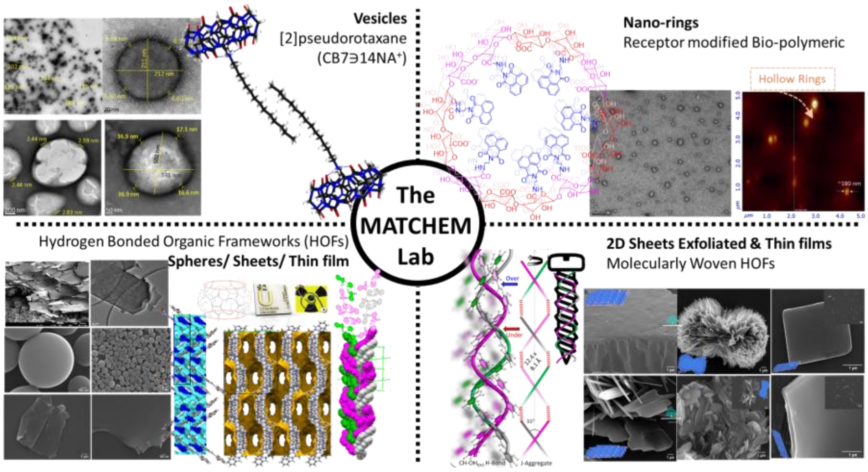
Non-covalent secondary interactions play a crucial role in enhancing the remarkable properties of naturally occurring materials. These features include self-cleaning, self-healing, and the structural integrity of DNA and RNA, which have sparked significant scientific interest in supramolecular self-assemblies driven by these interactions. The rapidly advancing fields of self-assembly and reticular chemistry have facilitated the creation of materials with precise two-dimensional molecular topologies and controlled lateral dimensions.

Self-assembled materials, powered by secondary interactions, present several notable benefits. These include ease of synthesis, processability, inherent flexibility, hydrolytic stability, and reversible self-healing. To introduce porosity and hydrolytic stability in these self-assembled materials, it is essential to carefully select organic linkers. This ensures the formation of stable and robust open frameworks that exhibit high crystallinity, mechanical strength, surface area, and desired porosity.

Future resource sustainability depends on efficient recovery, with seawater offering immense potential for energy production, water purification, and mineral extraction. Advanced functional self-assembled materials must meet key design criteria, including crystallinity, high surface area, interconnected porosity, stability, corrosion resistance, targeted selectivity, redox activity, and scalability. In our lab we target developing these challenging self-assembled porous materials tailored for specific functions.



Function Specific Self-Assembled Porous Materials