

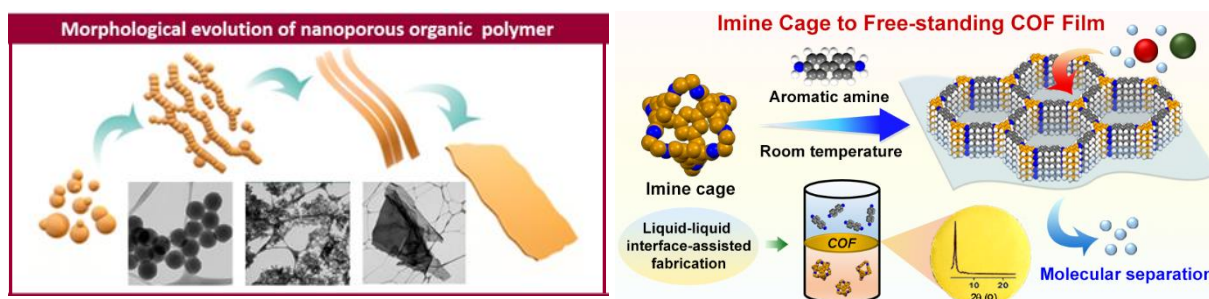
# Controlling Molecular Self-assembly toward Task-specific Porous Materials

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The intriguing self-assembled architectures in nature fascinate researchers to tune the morphology of the synthetic materials.<sup>1</sup> Morphology and textural features of materials are essential parameters to influence their physicochemical properties, such as porosity, adsorption, diffusion kinetics, and optoelectronic properties.<sup>2</sup> Morphological tunability of any supramolecular and macromolecular architectures demands detailed elucidation of the molecular self-assembly processes. In the present talk, I will discuss the self-assembly processes leading to the morphological evolution of hypercrosslinked porous organic polymers from nanospheres to nanosheets obtained through the solvent knitting process and the impact of morphology on polar molecule separation from water.<sup>3</sup> I shall also explain the molecular-level picture of an intriguing phenomenon of the dynamic covalent chemistry-directed room-temperature transformation of discrete organic imine cage-to-covalent organic framework (COF) film at the liquid-liquid interface. The unfolding of the cage leading to the generation of imine intermediates, followed by their interface-assisted preorganization and subsequent growth of the COF film, are elucidated through detailed spectroscopic and microscopic investigations.<sup>4</sup> The interfacial cage-to-COF transformation provides a facile route for the faster fabrication of free-standing COF films with high porosity and crystallinity, demonstrating excellent performance toward molecular sieving and high solvent permeance.<sup>4</sup>



**Figure 1:** Schematic illustration of deciphering the self-assembled nanoporous structures leading to hypercrosslinked polymers and crystalline nanoporous film at the liquid-liquid interface.

## References:

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