Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Organic Nanoporous Materials for Energy and Environmental Sustainability proteins

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Interfacial polymerisation developing processable nanoporous organic thin films of crystalline covalent organic frameworks (COFs) could be promising for applications from molecular separation to energy storage. In this context, we achieved a room-temperature transformation of an organic imine cage to a free-standing COF film at the aqueous-organic interface using an amine linker exchange strategy, producing highly porous and crystalline COF films in 24 h. The COF film showed high permeance and excellent molecular sieving performance. Additionally, a 2D electrochromic COF (EC-COF) film having tunable redox functionalities was developed at the solid-liquid interface with broad absorption across the UV-to-NIR range, showing three-state anodic electrochromism, high colour contrast (~60 % in the NIR), and fast switching. A prototype device using the EC-COF film as a safety indicator for electronic circuits has been developed. We further expand the scope of redox-active amorphous porous organic polymers in sodium-ion battery electrodes. The key aspects of some of these findings will be presented.

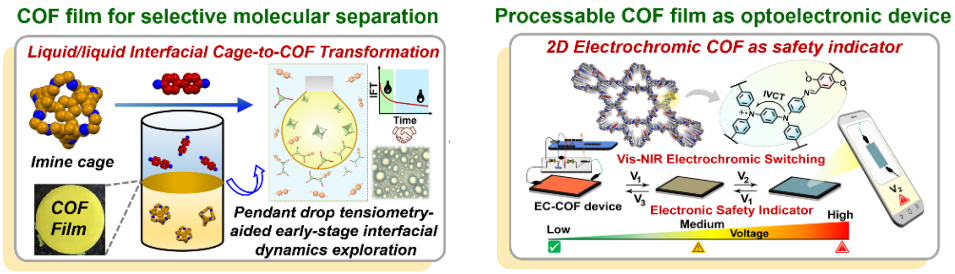

Figure The pictorial depiction illustrating the multi-faceted role of organic nanoporous materials as processable crystalline films at liquid-liquid interface and electrode-electrolyte interface demonstrating promising potential in molecular separation and optoelectronic devices.

Tuesday, Feb 18th 2025

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Seminar Hall, TIFRH