

*Sulfonic acid loaded self-standing covalent organic membrane for proton conduction*Himadri Sekhar Sasmal<sup>1</sup>, Rahul Banerjee<sup>1</sup><sup>1</sup>Physical And Material Chemistry, CSIR-National Chemical Laboratory, Pune., Pune, India

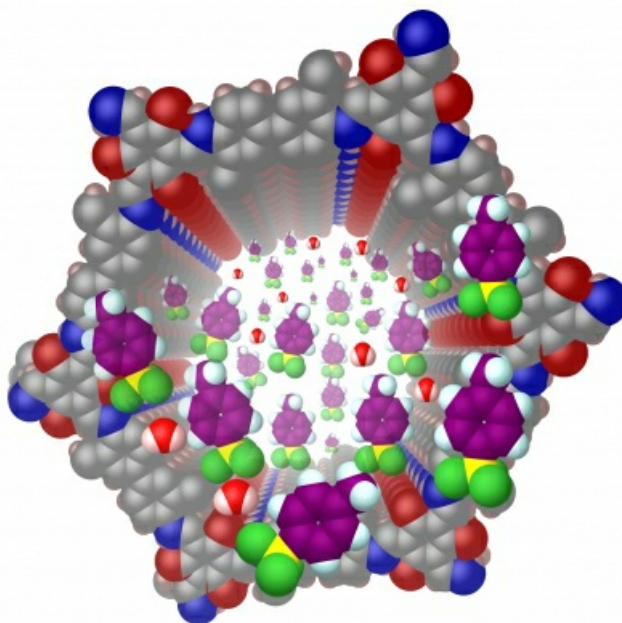
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Covalent organic frameworks (COFs) represent a new category of highly porous, crystalline polymers with uniformly arranged ordered pore channels. COFs have shown excellent promise as semiconductive devices, sensors, in gas storage, separation and in proton conductivity. But till now COFs have been synthesized as powder materials. For using COFs as proton conductive materials, COF powder has to be transformed into its pellet form. These pellets are prepared by applying high pressure onto the COF powder. These COFs pellet although shows proton conductivity but the conductivity is very low. This low proton conductivity can be explained by the decrease in crystallinity and surface area due to the applied pressure. To improve the proton conductivity, here we are making self standing, porous and crystalline COF membrane for the first time instead of pellet via baking of organic linkers in the presence of co-reagents, p-toluene sulfonic acid (PTSA) and water. Also PTSA is loaded in situ into the highly porous and crystalline COF which is found to be very easy and convenient process for synthesizing self-standing, flexible proton conductive membrane. Here the thickness of these flexible, self-standing membranes are been reduced to 100  $\mu\text{m}$  in order to improve the proton conductivity. These in situ PTSA loaded COF membrane can be a promising proton exchange membrane for fuel cell application.

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