

Proton conduction by sulfonic group functionalized mixed ligand coordination polymers

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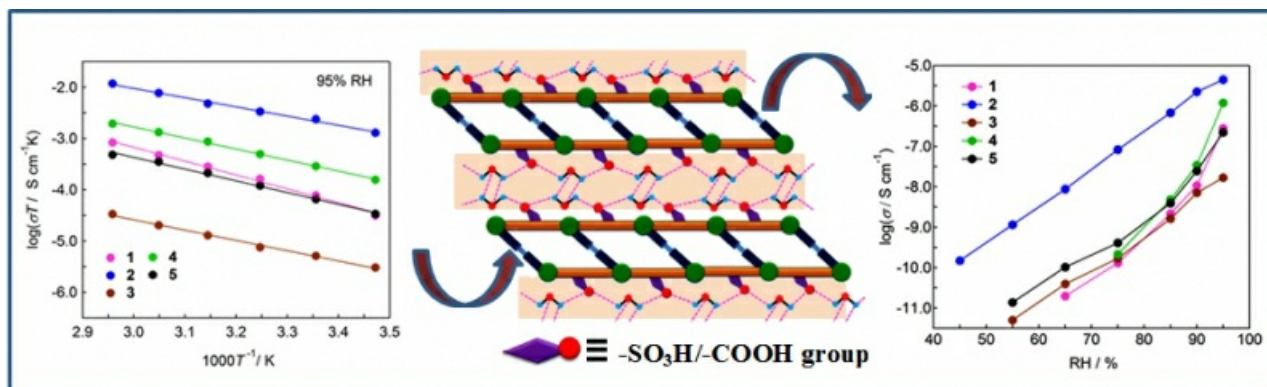
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Proton conducting materials play a significant role in many renewable energy and bio-electronic technologies including fuel cells, batteries etc. As a consequence, probing of the alternative energy sources is one of the hot topics now-a-days to the contemporary researchers in material chemistry due to the limited availability of natural energy resources and that is why the area of proton conduction took tremendous interest among the physicists as well as chemists. Compared to the traditional materials, coordination polymers (CPs) are more appealing because they can exhibit their precise structures that can be designed through judicious choice of metal ions and ligands. So the exploration of these high-performance proton conductive MOFs with desired thermal stability, crystallinity, structural tunability and easy synthesis, can afford well designed functional pore surfaces for proton-conducting pathways and also incorporate various guest molecules (e.g. free organic molecules and/or water molecules) as a proton conducting media in the void of the frameworks to make the channel more hydrophilic in nature.

Based on the above mentioned criteria, several sulfonic group functionalized mixed ligand coordination polymers have been synthesized using trisodium 5-sulfoisophthalate with the variation of the N-donor linkers and metal ions. Here, all the compounds contain either lattice water molecules and/or protonated N,N'-donor ligand within the pore of the frameworks or acidic uncoordinated $-SO_3H/-COOH$ groups (in few cases, $-SO_3^-$ group behaving as a proton acceptor) as well as coordinated waters, which are arranged along the pore surfaces. This phenomenon has been actually helpful to create an effective proton conducting medium in such compounds.

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