MOFs for Heterogeneous Catalysis

Srinivasan Natarajan

Framework Solids Laboratory, Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore 560 012, India. Email: snatarajan@iisc.ac.in

Inorganic Coordination Polymers (CPs) or Metal-Organic Frameworks (MOFs) have been investigated with much interest during the last two decades. The intense research activity resulted many new compounds that has potential applications in the areas of sorption, separation, sensing, heterogeneous catalysis, magnetism etc.[1-3] It is clear that a careful interplay of inorganic coordination preferences and organic functionality can lead to new framework compounds with interesting structure and properties. We have been concentrating on the use of multi-functional ligands for the prepration of CPs and employ such compounds towards heterogeneous catalysis. In addition, we have also employed porphyrins along with simple aromatic dicarboxylates to constructer new frameworks. The prepared compounds were employed for sensing, Lewis acid and base catalysis and also towards tandem catalysis.[4-6] In this presentation the findings of these studies would be described and discussed.

Acknowledgements: Thanks are due to Science and Engineering Research Board (SERB), Government of India for the award of a research project and JC Bose National Fellowship.

[1] Special issue on MOFs, *Advanced Materials*, **30**, (2018); *Chemical Reviews*, (2012); *Coord. Chem, Rev*., (2019)

[2] Recent advances and challenges of metal–organic framework membranes for gas separation, Z. Kang, L.Fan and D. Sun, *J. Mater. Chem. A*, **5**, 10073 – 10091 (2017).

[3] Grand Challenges and Future Opportunities for Metal–Organic Frameworks, C.H. Hendon, A.J. Rieth, M.D. Korzynski and M. Dinca, *ACS Central Sci*., **3**, 554 – 563 (2017)

[4] New Porphyrin Assembled Frameworks: Synthesis, Structure and Catalysis, G. Dutta, A.K. Jana, D. Singh, M. Eswaramoorthy and S. Natarajan, *Chemistry – An Asian Journal*., **2018**, *13*, 2677 – 2684; Zinc Porphyrin-Oxybisbenzoate Assembly into a Two-Dimensional Structure: Synthesis, Structure, Cu-exchange (Single-Crystal to Single-Crystal) and Heterogeneous Catalytic Studies, G. Dutta, A.K. Jana, S. Natarajan, *Chemistry – An Asian Journal*, **2018**, *13*, 66 – 72; Assembling Porphyrins into Extended Network Structures Employing Aromatic Dicarboxylates: Synthesis, Metal-exchange and Heterogeneous Catalytic Studies, G. Dutta, A.K. Jana and S. Natarajan, *Chemistry – A European Journal*, **2017**, *23*, 8932 – 8940.

[5] Cu_6S_6 clusters as a building block for the stabilization of metal-organic framework with NiAs, NaCl and related structures: synthesis, structure and catalytic studies, A.K. Jana and S. Natarajan, *European J. Inorg. Chem*., **2018**, 739 – 750; New Bi-Functional MOFs and their Utilization in One-Pot Tandem Catalytic Reactions, S. Mistry, A. Sarkar and S. Natarajan, *Crystal Growth & Design*, **2019**, *19*, 747-755.

[6] Fluorescent MOFs for selective sensing of toxic cations (Tl^{3+}, Hg^{2+}), highly oxidizing anions [$(CrO_4)^{2-}$, $(Cr_2O_7)^{2-}$, $(MnO_4)^{-}$] and adsorption/desorption of dyes, A.K. Jana, S. Natarajan, *ChemPlusChem*, **2017**, *82*, 1153 – 1163.; Selective Separation of Aliphatic Nitriles Employing a Two-Dimensional Interdigitated Coordination Polymer, S. Mistry, R. Hota and S. Natarajan, *Chemistry – An Asian Journal* (**2017**) , *12*, 1807 – 1815; Solvent Dependent Delamination, Restacking and Ferroelectric Behaviour in a New Charge-Separated Two-dimensional Compound: $[NH_4][Ag_3(C_9H_5NO_4S)_2(C_{13}H_{14}N_2)_2].8H_2O$, S. Sushrutha, S. Mohana, S. Pal and S. Natarajan, *Chemistry – An Asian Journal*, **2017**, *12*, 101-109; Palladium Nanoparticles Encapsulated in $[M(C_{19}H_{11}N_2O_2)_2.H_2O]$ (M = Co and Mn) as a Potential Catalyst for the Homo Coupling of Aryl Halides, A.K. Jana, R. Hota and S. Natarajan, Crystal Growth & Design, **2016**, *16*, 6992 – 6999.