

## Templating Holes in Materials -Phosphonate MOFs and Applications in Liquid Separations and Proton Conduction

Metal-organic frameworks are touted for tunable porosity based largely on a crystalline net-based (reticular) approach. Ultimately though, the properties of a solid are the sum of many contributing factors, including non-idealities such as defects. This presentation will discuss an approach to make MOFs based on a supramolecular self-assembly approach[1] where H-bonded intermediates are critical to assess a dynamic structural landscape. Ultimately, highly stable MOFs result that are stable in boiling water and strong acids. The structures of these materials are not single crystalline but are also not amorphous – they have an intermediate level of order where short-range structure is compromised but medium to long range order is retained depending on the system. This talk will discuss efforts to separate liquids using this approach and also to make better proton conductive systems.

[1] Huynh, R. P. S.; Evans, D. R.; Lian, J. X.; Spasyuk, D.; Siahrostrami, S.; Shimizu, G. K. H.\* Creating order in ultrastable phosphonate metal–organic frameworks via isolable hydrogen-bonded intermediates. *J. Am. Chem. Soc.* **145**, 21263-21272 (2023).