Metal-Organic Frameworks and Their Applications to Carbon Capture

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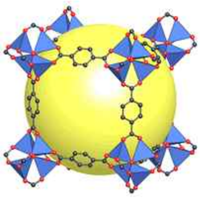
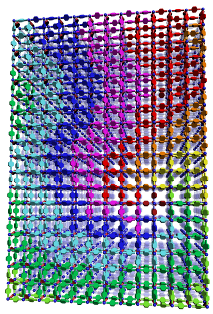
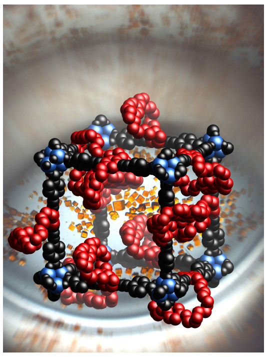
Metal-organic frameworks (MOFs) represent an extensive class of porous crystals in which organic 'struts' are linked by metal units to make an open networks. The flexibility with which the building units in MOFs can be varied and their ultra-high porosity (up to 11,000 m^2/g) have led to many applications in gas storage and separations for clean energy production, to mention a few. This presentation will focus on how one can design porosity within MOFs to affect highly selective separations and storage. Accordingly, examples will be given based on three porous domains which MOFs combine when they recognize and bind incoming substrates (guests): These domains are principally characterized by use of the pore opening to sort guests by shape and size selection (sorting domain A), the internal adsorption sites to compact guests (coverage domain B), and the complex units to bind guests in a selective manner (active domain C).







References:

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[2] Colossal cages in zeolitic imidazolate frameworks as selective carbon dioxide reservoirs, B. Wang, H. Furukawa, M. O'Keeffe, O. M. Yaghi, *Nature*, **2008**, *453*, 207-212.