The 171st iCeMS SEMINAR

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16:00-17:30

New Synthetic Routes toward Robust and Functionalized Metal-Organic Frameworks

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Venue: 2nd Floor Seminar Room (#A207)
iCeMS Main Building (#77), Kyoto University

The field of metal-organic frameworks (MOFs, or porous coordination polymers, a. k. a. PCPs) is built upon three pillars: cluster chemistry, organic synthesis, and X-ray crystallography. Robust metal-organic frameworks (MOFs) with high porosity are needed for applications such as gas storage, separation, and catalysis. In the late 1990s, metal-organic frameworks with high porosity were commonly made from commercially available ligands such as benzene dicarboxylate (bdc) and benzene tricarboxylate (btc) in a one-pot solvothermal reaction. Though straightforward, the scope of this synthetic method is limited and MOFs with desirable porosity, stability, and functionality for applications are difficult to obtain. Our research is focused on the discovery of new synthetic methods to access metal-organic frameworks that can perform unique chemical transformations and exhibit desired properties for clean-energy-related applications. Under this main theme, strategies such as construction of MOFs with desired porosity and functionality through ligand design, building MOFs one cavity at a time, metal-ligand-fragment co-assembly, MOF surface engineering, framework as a template for MOF preparation, post-synthetic metathesis and oxidation, and the preparation of MOFs from pre-assembled clusters, have been developed. In the presentation, I will focus on most recently developed MOF synthetic methods in my laboratory, especially those related to the three pillars of MOFs.

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