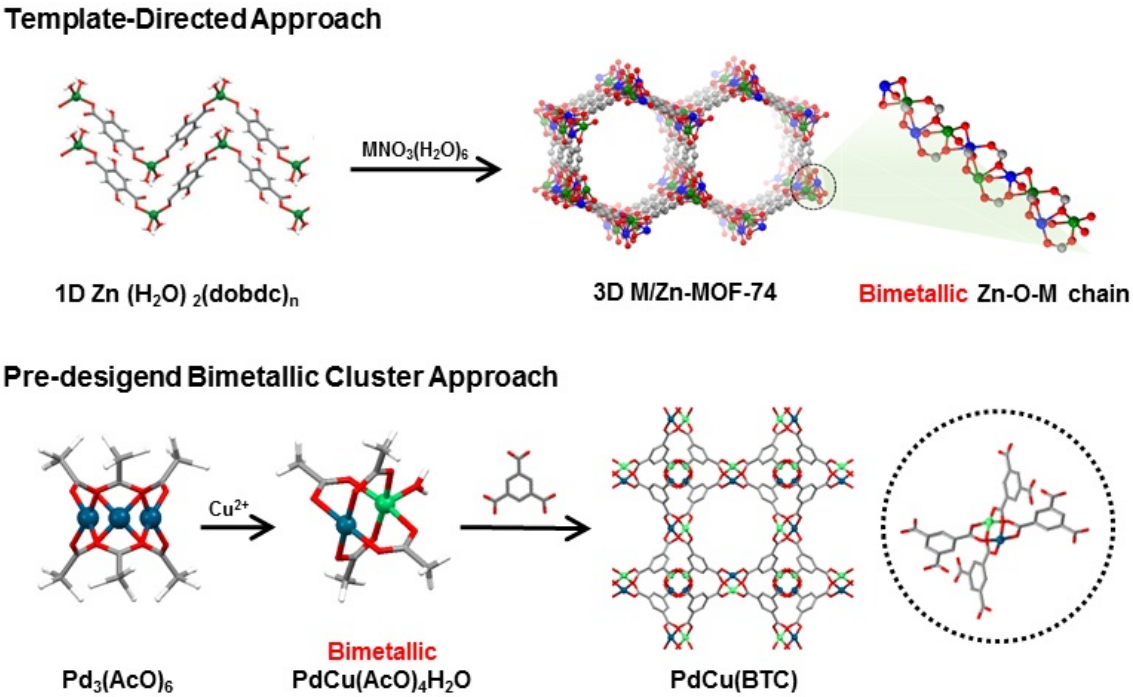
Ordered Heterogeneity in Multi-Metallic Metal-Organic Frameworks

Kyung Seob Song, Daeok Kim and Ali Coskun

Department of Chemistry, University of Fribourg, Fribourg 1700, Switzerland
kyungseob.song@unifr.ch

Multi-metallic metal–organic frameworks (MOFs) are crystalline, porous materials composed of metal clusters, which contains at least 2 different metal ions, coordinated to various organic linkers. The combination of these secondary building units (SBUs) not only control the porosity but also imparts unique functions for gas storage, gas separation and catalysis. For example, porous coordination polymers with different metal species show tunable CO_2 affinity in CO_2/CH_4 separation under dynamic separation conditions [1]. Recently mixed linker and/or mixed-metal MOFs have been shown to have synergetic effects. For example, bimetallic MOFs-74 exhibited enhanced H_2 storage ability and catalytic performance compared to the single metal MOFs-74. However, achieving atomic-level ordering in multi-metal MOFs is still quite challenging. These materials could lead to the development of materials with tunable magnetic, electrical and catalytic properties for gas application. In this context, we present the methods to precisely position single metal atoms and realize ordered heterogeneity in bimetallic MOFs. 1) Template-directed approach of bimetallic Mg/Zn- or Ni/Zn-MOF-74 [2] 2) Pre-designed bimetallic cluster approach for PdCu-HKUST-1 and PdCu-MOF-14 [3].



[1] K.S. Song, A. Coskun, *ACS Appl. Mater. Interfaces,* **2016**, *8*, 40, 26860
[2] D. Kim, A. Coskun, *Angew. Chem. Int. Ed.,* **2017**, *56*, 5071.
[3] D. Kim, K.S. Song, A. Coskun, *Chem. Commun.*, **2018**, *54*, 12218.