### Construction of New Supramolecular Structures via

### Arene-perfluoroarene Interactions:

###  Controlled Self-assembly of Paddle-wheel Complexes

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Control over the self-assembling process of metal complexes is of key importance to construct supramolecular materials and nano devices, which have unique physical and chemical properties. Paddle-wheel complexes consisting of two metal ions and four monoanionic bidentate ligands attract much attention because of their highly symmetric (*D*4h) structure suitable for the construction of continuous structure. In this study, we aimed to construct supramolecular architectures using paddlewheel dimer units via multipoint arene-perfluoroarene interactions.

To construct continuous structures of paddle-wheel units, we designed and synthesized a novel ligand, C6F5C2C6H4CO2H (H**L**). H**L** contains both benzene and perfluorobenzene moieties and can show arene-perfluoroarene interactions. Using this ligand, the syntheses of a paddle-wheel dimer was performed. Two kinds of complexes, Rh2(O2CCF3)2(**L**)2(3-pentanone)2 (**1**) and Cu2(**L**)4(THF)2 (**2**) were obtained. As shown in Figure 1, the molecular arrangements of **1** and **2** are stabilized by complementary interactions in the crystalline state. Interestingly, in the crystal packing of **2**, porous structure was formed by stacking of the two dimensional sheets via interaction between ligands. The pore entrance size of **2** was estimated to be 13.8 x 5.8 Å2 and THF molecules are contained as guest.



Figure 1 Controlled self-assembly of paddle-wheel complexes via arene-perfluoroarene interactions

[1]. T. Itoh, M. Kondo, M. Kanaike, and S. Masaoka, *CrystEngComm*, **2013**, *15*, 6122-6126.