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Design of novel supramolecular self-assembly creating noninterpenetrating rectangular grid with a neutral cavity

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Metal–organic composite materials with appropriate building blocks which can assemble into structures with specific and desired frameworks are challenging both for their solid state technology and for their chemical architecture. Of special interest is the construction of a microporous network that can exhibit reversible guest exchange and selective catalytic activities. The major problem encountered in the synthesis of molecular based microporous coordination polymers is the collapse of the structure upon removal of the included guest molecule in the cavity or interpenetration. Much less is known about extended two-dimensional systems based on molecular square sheets in general and rectangular grids in particular. By a judicious choice of the building units it is possible to design extended cationic, anionic and neutral frameworks with varied pore characteristics.

The results reported herein illustrate the utility of using the process of self-assembly for the construction of neutral rectangular architecture. By selecting appropriate metal (Co^{+2}, Cd^{+2}) coordination and different edge-sharing ligands (4,4 ¢bpy, phth), we have developed a synthetic strategy to construct two neutral, noninterpenetrating rectangular grids which are structurally characterized. To the best of our knowledge this is the third structure reported in the area of neutral rectangular assembly. The staggered stacking between the 2D sheets makes the structure less intriguing and reducing the cavity size which accommodates two water molecules by O–H…O interaction.