

Syntheses of Supramolecular Architectures Using Coordination Bonds and their X-ray Crystal Structures

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We have been interested in construction of supramolecular architectures including interlocked structures and open-frameworks using coordination bonds. Several years ago, we reported a simple approach to construct 1D polyrotaxanes.¹ It involves formation of a pseudorotaxane by threading a molecular “bead” with a “string” followed by reaction of the pseudorotaxane with a transition metal ion to form a 1D coordination polymer. The versatility of this approach is demonstrated by the fact it generates not only a variety of 1D polyrotaxanes but also 2D polyrotaxanes. More recently, we have been focusing our efforts on synthesis of molecular necklaces (MN), in which a number of molecular “beads” are threaded on a large circular molecular “string”. An approach similar to that described above allowed us to construct molecular necklaces [4]MN and [5]MN.^{2a} Using an L-shaped preorganized pseudorotaxane and a metal ion (or a metal complex) as glue we can also construct a molecular necklace [5]MN.^{2b} This work demonstrates the efficiency and control of our approach in construction of elaborated supramolecular species.

We have been also working on metal-organic open-framework materials. We reported a novel metal-organic open framework with large hexagonal channels that is self-assembled with cucurbituril and rubidium ions.³ Recently, we also constructed a homochiral metal-organic open-framework material capable of enantioselective separation and catalysis.⁴ Details of these structures will be presented.

References

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