

Molecular Wires, Linear and Cyclic

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Abstract:

Molecular wires are the simplest single-molecule electronic devices, and they can be viewed as the elementary components of bulk organic semiconductors. Molecular wire rings exhibit fundamentally different behavior from straight molecular wires, leading to the phenomenon of aromaticity [1]. This lecture will present the synthesis and investigation of several linear and cyclic molecular wires based on porphyrins, with emphasis on understanding electronic delocalization in longer chains and larger rings. The rigid structures of porphyrins lead to small reorganization energies, conferring low barriers for charge transport and electronic delocalization [2]. The presentation will include recent work on triple stranded porphyrin nanobelts, such as the 10-porphyrin nanobelt shown below in Figure 1 (X-ray crystal structure) [3], which feature strong electronic delocalization over the whole ring.

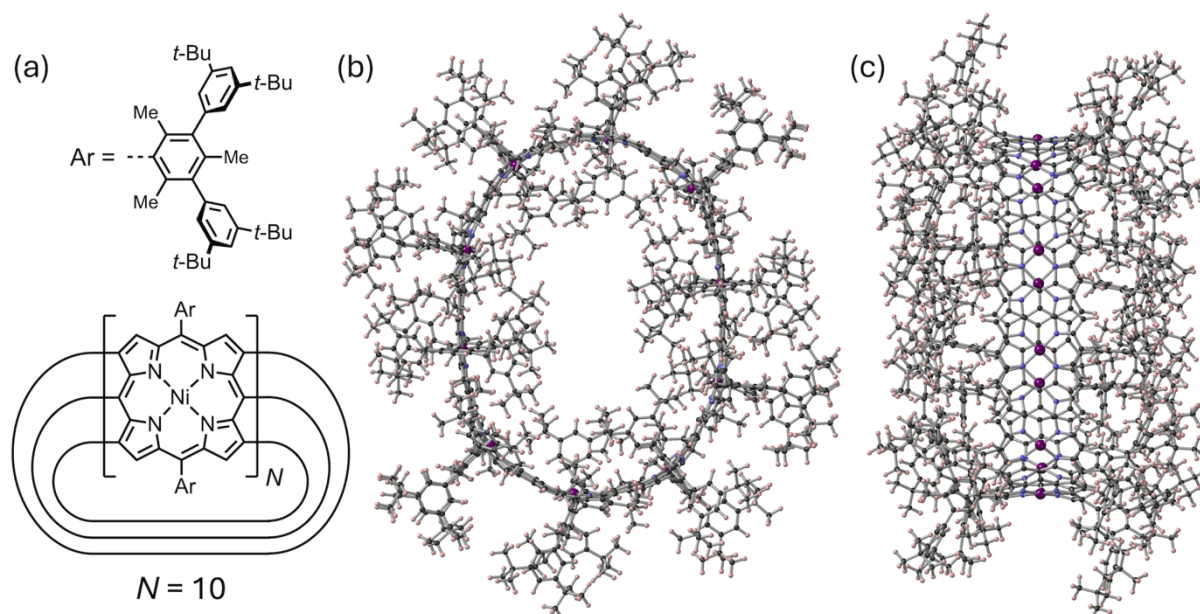


Figure 1. A triple stranded 10-porphyrin nanobelt. (a) connectivity; (b) and (c) orthogonal views from the X-ray crystal structure.

References:

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