Bridging Carbon Nanoscience and Organic Synthesis

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Graphitic nanomaterials (e.g. carbon nanotubes, graphene, and their related derivatives) have outstanding properties for a broad spectrum of applications ranging from electronics, molecular sensors, nanoporous filters, as well as energy generation and storage. These materials, however, are difficult to prepare in a uniform manner. The structural variation dramatically affects properties and performance. I will describe my research group's efforts to develop molecular syntheses and assembly strategies to prepare these types of structures with angstrom-level precision. Specifically, I will focus on our most recent work with the cycloparaphenylenes, or "carbon nanohoops," and their utility as a novel platform for molecular and materials design.