Twisting Molecules Toward Chirality: Helicenes and Nanographenes with Record Distortions

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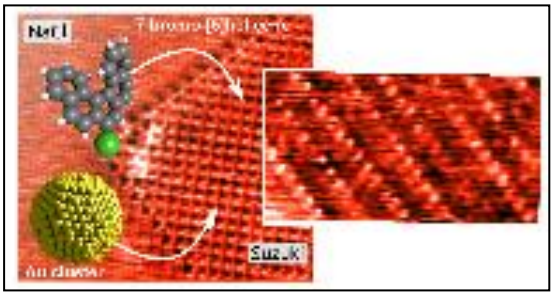
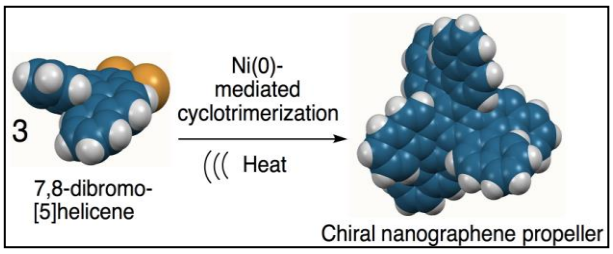
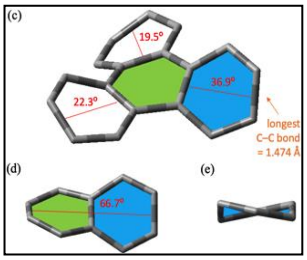
Helicenes are part of a chiral family of aesthetic and helicoidal molecules known for over 110 years, and with a rich history.(1) They were considered as an intellectual curiosity for several decades because of their distorted π-system, and a few mythic syntheses. Their attractiveness is not only due to their challenging syntheses, but also to their exalted chiroptical and electronic properties.(1, 2) They recently became the center of newly expanding research topics in the fields of asymmetric catalysis, advanced materials (dendrimers, conductors, polymers, liquid crystals, SAMs, films), molecular electronics, optics (e.g. OLED, chiroptical switches, NLO) and supramolecular helicoidal assemblies, such as twisted wires and foldamers.(2) Tailor-made helicenes are thus needed on a large scale. Following this trend, benzylic-type couplings(3,4) allow a scalable production of helicenes in good to high yields with possible derivatization using metal-catalyzed reactions. Some applications such as nc-AFM adsorption studies of helicenes on metal surfaces and on insulators led to the concept of "charge-matching" of molecules with ionic solids.(5) It showed interesting chiral layers with a long-range organizational behavior and nanopatterning. Helicenes were also used in chemical-biology, and a pioneer work on the diastereoselective formation of enantiomerically stable triple-fused helicenes embedding six helicene units have been reported among the first enantiomerically stable chiral nanographenes with record molecular distortions of some rings.(6)







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