Helicenes, Chiral Nanographenes and Polysulfurated Arenes with Dynamic and Outstanding Properties in Novel Aromatic and Materials Chemistry

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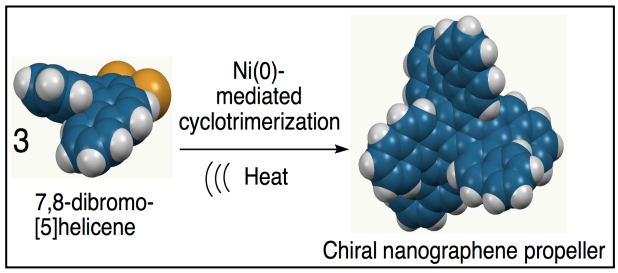
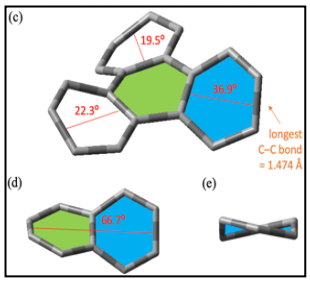
Abstract :

The first part of this lecture comprises helicenes with their chiral distorted π-system, which are known for over 120 years.[1] Their attractiveness is not only due to their syntheses[2] and helicity, but mostly to their exalted chiroptical, electronic and supramolecular properties.[1] They became the center of expanding subfields in asymmetric catalysis, molecular electronics, optics, spintronics and supramolecular assemblies,[1b] either on metal surfaces[2b,3] or on insulators.[4] Lately, triple-fused helicenes embedding six helicene motifs were reported among the first stable chiral nanographenes with a record distortion of a benzene ring, bond length alternation (Kékulé model), local aromaticity and metal ions complexation.[5,6] It contributes to explore aromaticity and the expanding field of stable chiral nanographenes.





A second part will report peculiar perthioarenes and polythiophenylene architectures of various topologies, their synthesis, and a survey of applications in materials science. They comprise asterisks, dendrimers and distorted molecules, which often incorporate dense sulfur and arene units,[7] leading to multifunctional and highly luminescent (phosphorescent and fluorescent)[8] nano-objects and sensors.[9,10] They represent an underexploited class of aromatic systems with rich supramolecular interactions, chiroptical and electronic properties, which could be modulated by some metal interactions, cation-π interactions and by some π-π complexes. Amongs the utmost important properties, pioneer dynamic covalent aromatic chemistry will be reported from the reversible nature of nucleophilic aromatic substitutions (S_NAr), thus enlighting new avenues in aromatic chemistry involving countless S_NAr reactions. One could call it : "The Sulfur Dance" around arenes and heteroarenes.[11,12]

Overall, this lecture will provide new insights in modern aromatic, dynamic and materials chemistry for the near future.

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