Tetraoxa[8]circulene-Based Porous Materials

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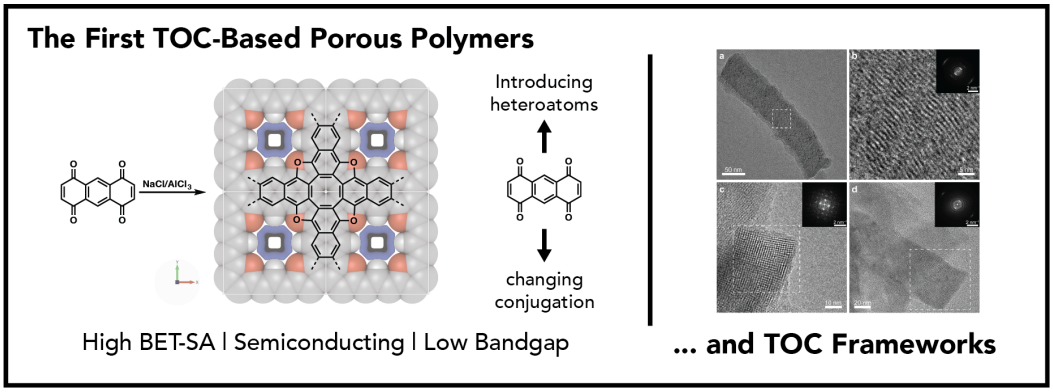
Tetraoxa[8]circulenes (TOCs) are a subclass of hetero[8]circulenes featuring a planar cyclooctatetraene core, endowing them with unique aromatic features, that influence their electronic properties, which made them the subject of several experimental and computational studies. [1,2] Despite this interest in small-molecule TOCs and ample interest by the computational community, extended TOC structures had not been reported in the literature.

Recently, we reported the first extended polymeric TOC (pTOCs) based on an acid-mediated cyclization procedure.[3] The obtained semiconductive polymers featured tunable porosity and could be post-synthetically modified or doped to further control their conductive properties. Based on these findings, we developed further protocols to change the degree of conjugation and to introduce heteroatoms into the pTOCs, thus further altering their physical and charge/electron transport properties.

Besides such porous organic polymers, TOC-based framework materials are exciting due to their ordered structures and more isotropic properties. To that end, we have developed suitable TOC-based linkers and prepared Cu-based metal-organic frameworks and boronate-ester-linked covalent organic frameworks. These materials exhibit excellent semiconducting properties and are currently being investigated as supercapacitors and ion conductors.



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