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Abstract

A Brief Journey around the World of Heteracyclo[n]phanes: Synthesis and CO_2 Adsorption †

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The optoelectronic properties of π-conjugated chromophores have been widely used since the discovery of the conducting properties of synthetic organic polymers in the late 1970s. Indeed, due to their chemical structures, organic conducting polymers exhibit electrical properties that provide useful materials, such as batteries, light-emitting diodes, antistatic packaging and coatings, microelectronic devices, photovoltaic cells, corrosion inhibitors, sensors, etc. Among them, polyaniline and polysulfide have been extensively studied for this purpose due to their environmental stability, oxidation, or protonation-adjustable electrical properties and low-cost production.

Nevertheless, these structures are generally depicted as linear structures, and there is an interest in achieving hemicyclic or cyclic analogue structures to extend their potential for use as metal–gas sequestering agents and/or sensing materials, as well as new organic cyclic semiconductors exhibiting different properties from their linear counterparts. In this context, we have recently developed a simple strategy based on a nucleophilic aromatic substitution reaction to achieve such cyclic derivatives, which are parent compounds of calixarenes with heteroatoms on the bridge, affording the desired heteracalixarenes and mixed heteracalixarenes or the hemicyclic scaffold in high yields. Some examples and properties will be presented herein, as well as the on-going research toward identifying nanoarchitectures that can be integrated into devices such as sensors.

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