Fabrication and Applications of Multifunctional Porous Organic Polymers

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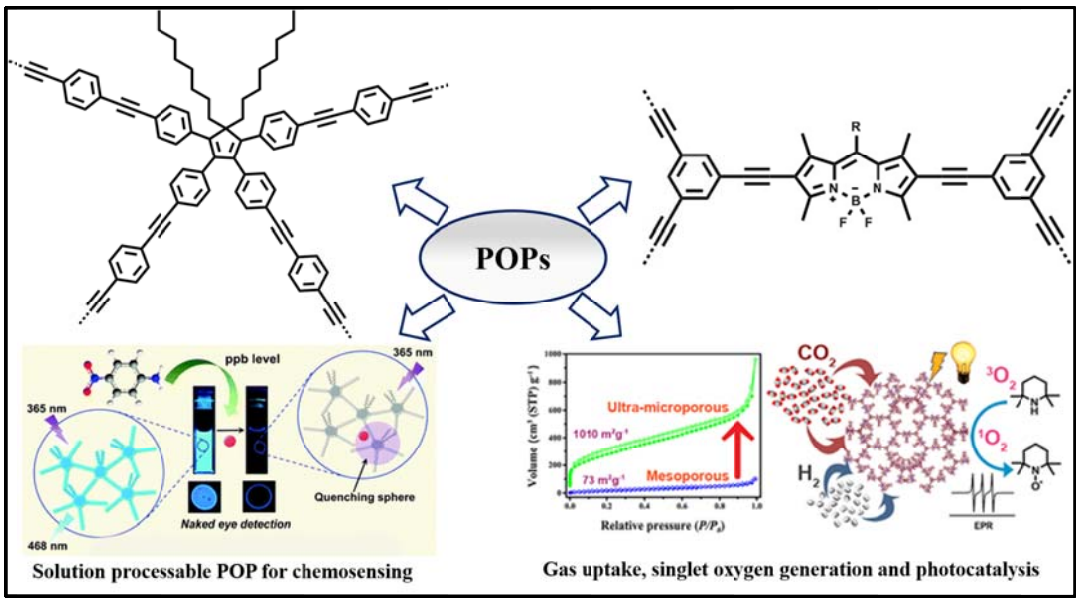
Abstract:
Starting from the grand old activated charcoal to zeolites, porous materials have been utilized for environmental and technological benefits for mankind. Of late, porous organic polymers (POPs) have emerged as a new class of functional materials with applications ranging from gas adsorption, gas and liquid separtion, catalysis, light harvesting to chemo/ bio-sensing.[1] However, fabrication of a single porous material capable of exhibiting a range of different applications still remain a challenge. In this regard, we have developed POPs based on a new core of tetraphenyl-5,5-dioctylcyclopentadiene (TPDC).[2] Apart from gas adsorptions, these solution processable POPs were employed for nitroaromatics sensing by amplified fluorescence quenching (Fig. 1). In order to understand the quenching process, we have investigated a broad set of analytes ranging from nitrophenols, nitrotoluenes, nitroanilines, quinones to nitrobenzenes. Interestingly, nitroanilines are found to be the most efficient quenchers in contrast to the extensively studied picric acid.[3]
We also fabricated POPs having 4,4-difluoro-4-bora-3a,4a-diaza-s-indacenes (BODIPY) core with tunable surface areas and porosities (Fig.1). Detailed gas adsorption studies of the polymers revealed a high uptake of CO_2 and H_2. POPs developed in the present study were found to be promising materials for generating singlet oxygen. The BODIPY based POPs turned out to be excellent catalysts for visible-light-driven photooxidation of thioanisole with 96% conversion.[4]



References:

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