Title:	Functional Porous Organic Polymers for Sensing and Catalytic Applications
Authors:	Nailwal, Yogendra (/jspui/browse?type=author&value=Nailwal%2C+Yogendra)
Keywords:	Organic Sensing Catalytic
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Abstract:	Abstract Porous organic polymers (POPs) have emerged as potential smart, functional materials for various applications in recent years because of the combination of extended π-conjugation and permanent microporosity in their backbone. The skeleton of these POPs can be decorated by introducing a variety of functional groups to tune their properties during the selection of building units. POPs come with many unique pre-installed features such as permanent microporosity, perpetual pore channels, high surface area, high thermal and chemical stability, etc. Because of these properties, POPs have been exploited in numerous applications such as gas storage and separation, catalysis, sensing, energy storage, proton conduction, drug delivery, and so on. Among all POPs, covalent organic frameworks (COFs) are crystalline porous materials synthesized via purely organic building units which are connected by strong covalent bonds. The high surface area and regular pore channels of COFs have attracted enormous attention in the recent past for their utilization in many applications. In addition, conjugated microporous polymers (CMPs) are another widespread class of POPs that is amorphous in nature. The easy synthetic route, wide variety in the choice of building units, and applications in several areas are attractive features for their immeasurable acceptance. This presentation describes five examples of strategic design and synthesis of new COFs and CMPs for sensing and catalytic applications. The first example shows the development of truxene- based COF (Tx-COF-2), and its use as both a visible-light heterogeneous catalyst and an HCl sensor. 1 The second example demonstrates the construction of three luminescent CMPs (Tx- CMPs) from truxene core and their application for the fast and selective detection of Picric acid. 2 The third example describes the design and synthesis of donor-acceptor (D-A) type CMPs developed from the truxene and N, N′-biscarbazole as donor units and 2,1,3 benzothiadiazole derivatives as acceptor units. The fourth example shows the study of the role of intralayer hydrogen bonding for fast crystallization in hydrazone-linked COF (Bth-Tp-COF). The active metal coordinating sites offered by Bth-Tp-COF is an ideal tool for the incorporation of Pd nanoparticles forming a metallated Pd/Bth-Tp-COF, which acts as a heterogeneous catalyst for the Suzuki- Miyaura coupling reaction. 3 The last example shows the synthesis and characterization of two series of COFs consisting of anthraquinone units. Based on the symmetry of the aldehydic linker, these series are designated as [D 2h + D 2h] and [D 2h + C 2] COFs. We believe that this presentation will open up several new strategies to develop simple and smart materials for various practical applications. 1 Macromolecules 2021, 13, 6595–6604. 2 ACS Appl. Polym. Mater.
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