Perspective

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Porous Covalent Organic Frameworks: A Tool for Sensing Applications

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ABSTRACT

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Prospective

Porous Covalent Organic Frameworks (COFs) are the crystalline polymers, which are formed by participation of organic building blocks into an ordered structure through strong covalent bonds [1]. As COFs are found to be formed from purely organic building blocks, which shows exceptional stability in a wide range of organic and inorganic solvents, thus, COFs have shown diverse applications in the field of gas storage and their separation, catalysis, chemosensing, energy conversion, future generation fuel cells, nanoscale drug delivery and sensing applications [2-7]. However, the sensing of toxic elements, like heavy metals, anions and explosives are important to mankind [8,9] In view of this, fluorescent COFs have found to be important candidates for various sensing applications due to its high selectivity, rapid response time, tunable pore size and structure, permanent porosity, high surface area and thermal stability, low density and real-time monitoring [10,11]. However, strong fluorescence in COFs is difficult to obtain due to multiple electron states. The rotation of bonds and π-π interactions in COFs leads to low fluorescence quantum yield. To avoid this, researchers have developed new COFs having Aggregation-Induced Enhancement (AIE) property [12]. Thus, various significant properties of COFs showed that the fluorescent COFs would be favorable tool for fluorescence sensors [13-23]. Despite of having high stability of COFs compared to other porous polymers, COFs are less explored in sensing applications due to their less moisture stability. To utilize these materials for real life applications moisture stability is of utmost importance. Thus, we believe that new design strategies should be used to improve the moisture stability. It was also obserbved that in the reported sensing applications, COFs has been used in organic solvents. Similarly for real-life applications, the functioning of sensors in water must be considered. To maximize the efficiency of COFs as sensory materials, the reusability of these porous frameworks should be considered. Thus, it will be of great benefit for the research community, if one can find proper solutions to these issues or develop a system having above mentioned properties in the COFs material.

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