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Decoding the Morphological Diversity in Two Dimensional Crystalline Porous Polymers

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The Crystalline Porous Polymeric materials (CPPs) also well known as Covalent Organic Frameworks (COFs) have concerned substantial research interest because of their extensive applications in molecular storage and separation, catalysis, sensing, opto-electronics etc. [1]. The overall properties and real time employments of such materials not only rely on the compositions but also their nano-scale morphology which plays an incredible role [2]. Therefore, an explicit understanding of the morphology-modulation with respect to their constituents is really demanding. This study accounted a detailed molecular level investigation on morphological evaluation in COFs emanates entirely from its primary building units.
Here two new highly crystalline, permanently porous imine linked based COFs named 2,3-DhaTta (Surface area 1700 m2/g) and 2,3-DhaTab (Surface area 413 m2/g) was solvothermally synthesised by faintly varying linker core while retaining all other external factors unchanged. These COFs are found to self template into diverge morphologies including ribbons (2,3-DhaTta) and hollow spheres (2,3-DhaTab). Their mechanisms of formation have been thoroughly and systematically investigated where hollow sphere formation in this case was guided by inside out Ostwald Ripening phenomenon. Moreover, based on DFT (Density Functional Theory) study a significant correlation between stacking energy of two adjacent COF layers with their backbone planarity was established which was believed to be the predominant guiding factor for governing their crystallinity, porosity and morphological diversity evaluation [3].
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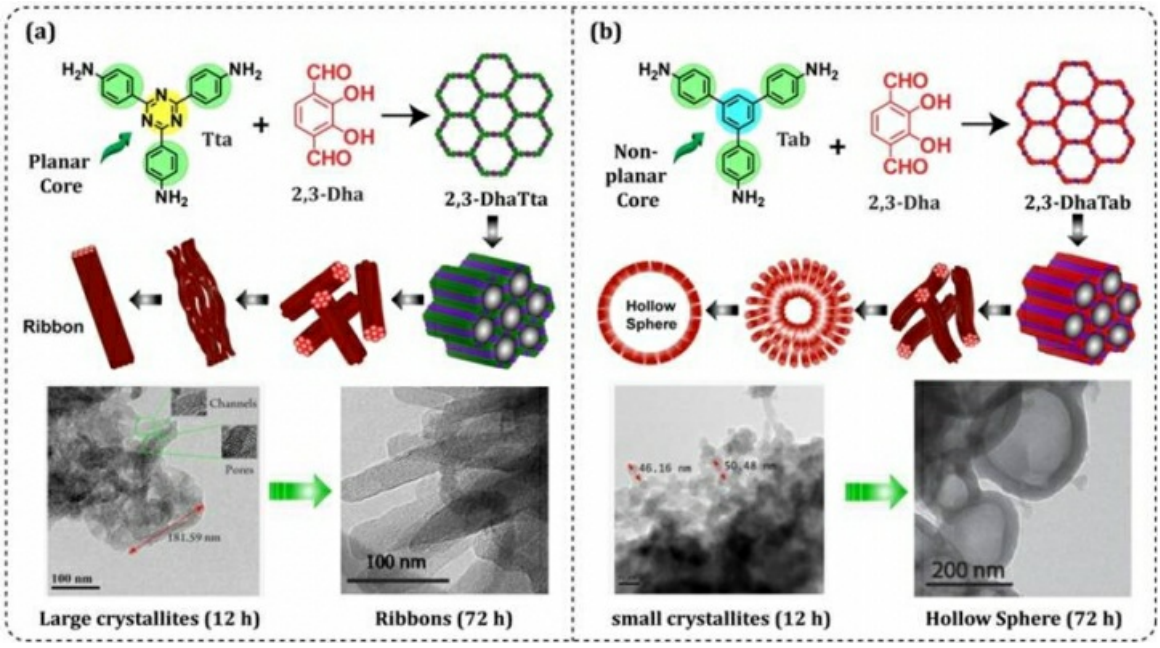

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