Crystallographic Evidence of Water Repulsion in Fluorous Nanochannels

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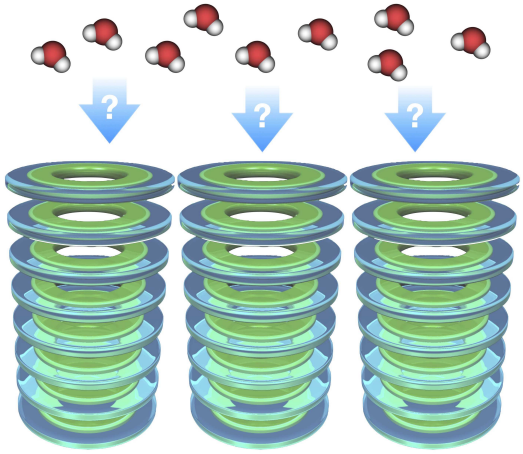
Keywords: Fluorous Nanochannel; Crystal Engineering; Super Hydrophobicity; Hydrogen Bonding

Fluorous nanochannels have demonstrated unprecedented potential for ultrafast water desalination as transmembrane single-channels, offering groundbreaking opportunities to address global water scarcity.[1] Their exceptional ability to rapidly and efficiently separate water from salts stems from their superhydrophobic fluorous interiors, which can break water clusters into smaller species that permeate faster while rejecting salts completely through an electrostatic barrier.[2,3] Although these properties have been extensively studied at the single-channel level, their behavior and functionality in aggregated or bulk states remain largely unexplored, leaving a significant gap in our understanding of their practical applications.

In this presentation, we report the successful synthesis of porous crystals featuring fluorous nanochannels. Crystallographic analyses revealed the influence of fluorine moieties within these nanochannels on hydrogen-bonding networks between the channels and water molecules. The precise control of fluorous nanochannels in crystalline structures enables rational material design and bridges the gap between laboratory discoveries and practical applications.



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