Outstanding PFAS Removal from Water Using Tailored Porous Polymers

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The persistence and toxicity of per- and polyfluoroalkyl substances (PFAS) in water systems remain a critical environmental challenge, with increasing regulatory scrutiny and global efforts to phase out their use.[1] Conventional adsorbents often fall short in balancing uptake capacity, kinetics, and reusability—parameters essential for meaningful remediation.

In this work, we present a new class of hypercrosslinked polymer networks engineered to address these limitations. The materials exhibit a maximum uptake capacity exceeding 1500 mg g^{-1} for perfluorooctanoic acid (PFOA, **Figure 1**), with complete adsorption achieved within one hour at low concentrations. They are readily synthesised from inexpensive precursors, display excellent structural and thermal stability, and maintain performance over multiple regeneration cycles. Our findings offer a promising platform for scalable water purification technologies and contribute to the broader effort of designing practical materials for persistent pollutant removal.

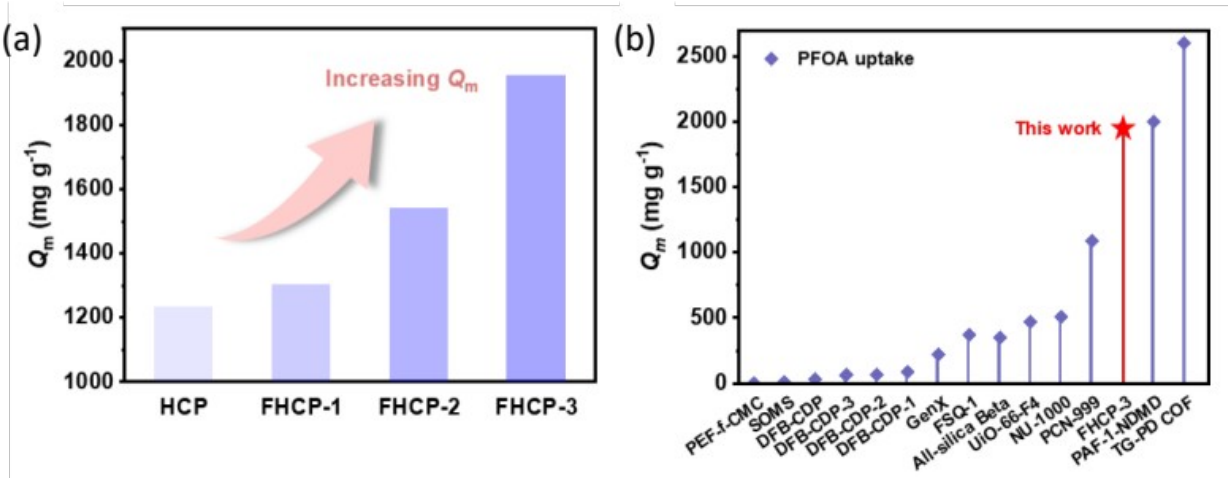

Figure 1. (a) Maximum adsorption capacities, Qm, of our HCP adsorbents for PFOA. (e) PFOA adsorption capacity of our best-performing polymer (red) compared with reported adsorbents from the literature (purple)

Keywords: PFAS remediation; adsorption; porous organic polymers; water purification; persistent pollutants

References

[1] Lim X.; Could the world go PFAS-free? Proposal to ban 'forever chemicals' fuels debate. *Nature* **2023**, 620, 24