POROUS POLYMER NETWORKS FOR PER- AND POLY-FLUOROALKYL SUBSTANCE SEPARATIONS

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PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2025/235535	01/02/2026	2024-114

BRIEF DESCRIPTION

Per- and polyfluoroalkyl substances (PFAS), known as "forever chemicals," are pervasive environmental contaminants that are notoriously difficult to remove from water due to their strong carbon-fluorine bonds and low concentrations. Researchers at UC Berkeley have developed a platform of functionalized Porous Polymer Networks (PPNs), such as PPN-6 (also known as PAF-1), specifically engineered for the selective capture and separation of these substances. By post-synthetically modifying the polymer framework with diverse chemical moieties—including fluorinated alkylammonium groups—the team created a library of adsorbents that leverage a synergistic combination of electrostatic, hydrogen-bonding, and fluorophilic interactions. These materials act like molecular "sponges" that can rapidly and selectively bind both short-chain and long-chain PFAS from complex water matrices, achieving near-complete removal in less than 30 seconds.

SUGGESTED USES

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Industrial PFAS Remediation: Large-scale capture of "forever chemicals" from municipal water supplies and industrial wastewater.

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Semiconductor Manufacturing: Ultra-purification of process water to prevent PFAS interference in microchip fabrication.

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Point-of-Use Filtration: Integration into high-performance consumer water filters for households in high-risk contamination zones.

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Environmental Site Monitoring: Use as a stable sampling medium for detecting trace levels of fluorinated organic compounds in groundwater.

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Chemical Separations: Tailoring the polymer's pore environment for the selective recovery of high-value fluorinated molecules in pharmaceutical synthesis.

ADVANTAGES

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Materials & Chemicals**

» Chemicals

» Other

» **Research Tools**

» Other

» **Sensors & Instrumentation**

» Analytical

RELATED CASES

2024-114-0

Rapid Kinetics: Reaches adsorption equilibrium in under 30 seconds, significantly faster than commercial granular activated carbon (GAC).

»

High Capacity and Selectivity: Exhibits capacities up to 4.0 mmol/g, outperforming traditional adsorbents even in the presence of competing ions and organic matter.

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Dual-Targeting Mechanism: Simultaneously captures difficult-to-remove short-chain PFAS (via electrostatic/H-bonding) and long-chain PFAS (via hydrophobic/fluorophilic interactions).

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Regenerable and Reusable: PFAS can be desorbed from the network, allowing the PPN to be recycled for multiple cycles with minimal loss in performance.

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Tunable Framework: The pore environment can be chemically customized to target specific emerging contaminants or varying water chemistries.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Next-Generation Metal-Organic Frameworks With High Deliverable Capacities For Gas Storage Applications
- Selective Carbon Monoxide Uptake via Metal Carbanion Functionalized Metal-Organic Frameworks
- Structures and Apparatus using Three-Dimensional Linked Networks
- Gas Separations With Redox-Active Metal-Organic Frameworks
- Metal-Organic Frameworks For Aromatic Hydrocarbon Separations
- Novel Porous Organic Polymers for Ammonia Adsorption
- Isothermal Carbon Capture And Release Of Carbon Dioxide With Molecular Polyamines
- Selective Nitrogen Adsorption Using a Vanadium Metal-Organic Framework
- Metal-Organic Frameworks for H2 Adsorption and Drug Delivery
- Separation Of 1-Butene From 2-Butene Using Framework Open Metal Sites
- Redox-Active Metal-Organic Frameworks for the Catalytic Oxidation of Hydrocarbons
- Phase Change Adsorbents For Storage And Separation Applications

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