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A versatile porous 3D polyurethane/polyacrylic acid (PU-PAA) membrane for one-step multiple contaminants water purification

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Abstract: Developing versatile materials for simultaneous removal of organic dyes, heavy metals and oil from water has big significance for water protection. Herein, we fabricate a porous 3D polyurethane/polyacrylic acid (PU-PAA) membrane by simple solvent casting-salt leaching and thermal crosslinking, which combines the properties of underwater superoleophobicity and quantities of carboxyl groups. The stable superoleophobicity can be used for efficient surfactant-stabilized oil-in-water microemulsions separation. And the negative carboxylic ions are able to capture cationic dyes and heavy metals, simultaneously. Using the PU-PAA membrane in filtration column enables one-step multiple pollutants water treatment with high flux, selectivity, recyclability, efficiency and capacity. Moreover, PU-PAA can be used for efficient dye mixture separation. These results indicate that this versatile porous 3D membrane can be a very potential candidate for advanced purification applications.

Keywords: porous 3D membrane, microemulsions separation, cationic dyes, heavy metals, dyes separation

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