



SEMINAR סמינר

Nitrogen-rich, Polyethyleneimine-based, Interpenetrating Network Porous Monoliths: Synthesis and Application

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Highly porous, crosslinked polyethyleneimine (PEI)-based hydrogels, with amine groups in the framework, may offer superior performance to existing water purification adsorbents, which exhibit poor regeneration performance due to PEI leaching. Here, PEI-based monoliths with high porosities (polyMIPes) were crosslinked with bisphenol A diglycidyl ether (BPDE) within oil-in-oil medium internal phase emulsions (MIPes). The formation of interpenetrating polymer networks (IPNs) was used to enhance the mechanical behavior by limiting macromolecular mobility and to modify the adsorption properties. The influences of the macromolecular structures, the macroporous structures, and the densities on the mechanical properties and on the adsorption performance were investigated.

PEI-BPDE polyMIPes with different crosslinking ratios exhibited densities between 0.11 and 0.72 g/cm³ and absorbed up to 0.23 g/g methyl orange, a model water pollutant, within one day. Monoliths synthesized using Pluronic P-123 as a surfactant exhibited a typical emulsion-templated structure and were denser, stiffer, and less adsorbent than the friable monoliths synthesized using Pluronic F-127, which exhibited a coral-like structure. IPNs synthesized using various monomers, including 4-vinylpyridine, vinyl imidazole, acrylamide, and hydroxyethyl methacrylate were investigated and IPNs based on poly(4-vinylpyridine-*co*-ethylene glycol dimethacrylate) (P(4VP-*co*-EGDMA)) were investigated in more detail. IPN formation successfully increased stiffness, however, surprisingly, it did not improve adsorption (~0.15 g/g) despite the increase in void size (from 1.8 to 3.4 μm) and the decrease in density with increasing P(4VP-*co*-EGDMA). IPN formation with the less hydrophilic P(4VP-*co*-EGDMA) limited the swelling, reducing solution diffusion into the adsorbent. This work demonstrated that PEI-based polyMIPes can act as adsorbents that can be modified through the formation of IPNs.

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ההרצאה תתקיים ביום חמישי, ה' – 23 באוקטובר 2025 בשעה 13:30
באודיטוריום ע"ש דויד וואנג, בניין מידן, קומה 3

**The lecture will take place on Thursday, October 23rd, 2025 at 13:30
David Wang Auditorium, 3rd Floor, Maydan Building**

כיבוד קל יוגש לפני הסמינר.
Light refreshments will be served before the seminar.