



סמינר SEMINAR

Hierarchical Porosity in Emulsion-Templated Block Copolymer Monoliths: Phase Separation, Degradation, and Hypercrosslinking

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Hierarchically porous polymers with micropores (< 2 nm), mesopores (2 to 50 nm) and macropores (> 50 nm) combine high specific surface areas (SSAs) with enhanced flow and diffusion for filtration, separation, adsorption, and reaction substrates. Here, hierarchically porous polymers were designed by generating emulsion-templated macroporous monoliths based on ABA, ABA-like, or CABAC block copolymers (BCPs). The atom transfer radical polymerization (ATRP) synthesized BCPs (both thermal ATRP and photoATRP) were formulated to enable the generation of hierarchical porosities. Mesopores were introduced by selectively degrading the poly(ϵ -caprolactone) (PCL) B blocks. The other blocks, based on polystyrene (PS) and/or poly(glycidyl methacrylate) (PGMA), formed the structural framework. Crosslinking was effected by copolymerizing with divinylbenzene (DVB) or by reacting the PGMA epoxides with tris(2-aminoethyl)amine (TAEA). Micropores were introduced by hypercrosslinking the styrenic blocks.

Three main systems were investigated. (1) P(S-co-DVB)-PCL-P(S-co-DVB): Hypercrosslinking the BCP-like monoliths led to PCL removal and micropore formation, generating an SSA of 798 m²/g, a pore volume of 0.359 cm³/g, and pores ranging from 0.6 nm to 3.8 nm. (2) PGMA-PCL-PGMA: A BPC-based monolith was synthesized by crosslinking the PGMA. PCL was removed using 0.1 M NaOH, resulting in mesopores of 11.1 nm, an SSA of 53.9 m²/g, and a pore volume of 0.262 cm³/g. (3) PGMA-PS-PCL-PS-PGMA: A BPC-based monolith was synthesized by crosslinking the PGMA. PCL was removed using 3 M NaOH and the PS was then hypercrosslinked to generate an SSA of 156.9 m²/g, a pore volume of 0.236 cm³/g, 5 nm mesopores, and 1.3 nm micropores. This research has demonstrated that hierarchical porosities in macroporous emulsion-templated monoliths based on ATRP-synthesized BCPs can be pre-designed through the BCP formulation, the crosslinking strategy, and the post-synthesis modifications (etching, hypercrosslinking).

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ההרצאה תתקיים ביום חמישי, ה' – 17 ביולי 2025 בשעה 13:30
באודיטוריום ע"ש דויד וואנג, בניין מידן, קומה 3

**The lecture will take place on Thursday, July 17th, 2025 at 13:30
David Wang Auditorium, 3rd floor, Maydan Building**

כיבוד קל יוגש לפני הסמינר.

Light refreshments will be served before the seminar.