SEMINAR סמינר

Hierarchical Porosity: Foaming Emulsion-templated Interpenetrating Polymer Networks

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PolyHIPEs are highly porous, emulsion-templated polymer monoliths with micrometer-scale porosity synthesized within high internal phase emulsions (HIPEs). Templating within water-in-oil HIPEs with two independent polymerization and crosslinking pathways enables the formation of interpenetrating polymer network polyHIPEs (IPN-PHs). Hierarchically porous polyHIPEs (HP-PHs), consisting of micropores (<2 nm), mesopores (2-50 nm), and macropores (>50 nm), are of interest for many applications, including adsorption, tissue engineering, and energy storage. The objective of this research was to synthesize HP-PHs via the formation of IPN-PHs. The IPN-PHs contained a free-radical polymerized styrenic network and step-growth polymerized poly(urethane urea amide)s (PUUAs) based on castor oil and either linear or aromatic isocyanates that undergo CO2 foaming owing to the presence of both water and carboxylic acids. The resulting semi-IPN polyHIPEs had open-cell structures with millimeter-scale (CO2 bubbles) and micrometer-scale (emulsion droplets) pores and densities ranging from 0.06 to 0.25 g/cm3. Hypercrosslinking of the styrenic polymer using a Friedel Crafts reaction generated microporosity, with specific surface areas up to 227 m2/g, and also partially dissolved the PUUA, generating mesoporosity. This combination of emulsion templating, foaming, IPN formation, and hypercrosslinking enabled the formation of pre-designed hierarchical porosities over a broad range of size scales.

Supervisor: Prof. Michael S. Silverstein

ההרצאה תתקיים ביום ראשון, ה – 11 בינואר 2026 בשעה 13:30
באודיטוריום ע"ש דויד וואנג, בניין מידן, קומה 3

The lecture will take place on Sunday, January 11th, 2026 at 13:30
David Wang Auditorium, 3rd Floor, Dalia Maydan Bldg.

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