הפקולטה למדע והנדסה של חומרים
Department of Materials Science & Engineering
הטכניון
מכון טכנולוגי לישראל

SEMINAR סמינר

Porous Shape-memory Polymers Synthesized through Emulsion Templating

Rotem Horowitz, MSc Candidate

Department of Materials Science and Engineering,
Technion – Israel Institute of Technology, Haifa, Israel

PolyHIPEs, porous polymers with open-cell, highly interconnected pore structures are synthesized through templating within high internal phase emulsions (HIPEs), emulsions in which the internal phase occupies more than 74% of the volume. The porous structure and properties can be tailored by adjusting the HIPE composition and by modifying various synthesis parameters. PolyHIPEs synthesized within Pickering HIPEs are stabilized using nanoparticles (NPs) that can also function as centers of crosslinking and initiation. Previously, shape memory polyHIPEs (SMPHs) were synthesized using acrylate or methacrylate monomers bearing long, crystallizable, aliphatic side-chains. A temporary shape, imparted above the crystalline melt transition (T_m), was “locked in” upon quenching below the T_m. Shape memory behavior was produced by the crosslinked network returning to the original shape upon "unlocking" above the T_m. The use of HIPE-stabilizing, polymer crosslinking, surface-modified silica NPs was critical to achieving SMPHs.

The objectives of this research were to develop novel families of SMPHs and to enhance the shape memory effect by varying the crystallizable monomer, the emulsification strategy (NPs, surfactant) and the cross- linking strategy (NP type, NP location) upon the macromolecular structure, porous morphology, crosslinked network, mechanical and thermal properties, and shape memory behavior. PolyHIPEs were successfully synthesized from acrylates and methacrylates with aliphatic side-chain lengths of 18 and 22. The porous structures were, for the most part, similar to those of typical SMPHs and the densities ranged from 0.13 to 0.20 g/cc. Novel HIPE stabilization moieties and polymer crosslinking moieties achieved shape recovery ratios of 100%, higher than achieved previously.

Supervisor: Prof. Michael S. Silverstein

ההרצאה תתקיים ביום ראשון, ה- 19 ביוני 2016 בשעה 14:30

באודיטוריום ע"ש דיוויד וואנג, קומה 3, בנין דליה מידן

The lecture will take place on Sunday, June 19th, 2016 at 14:30,

David Wang Auditorium, 3rd floor Dalia Maydan Bldg.

כיבוד קל יוגש לאחר הסמינר