Department of Materials Science and Engineering,

PhD Proposal

Wednesday September 24th 10 AM
ECE Seminar Room Bossone 302

Accessing Variable Glass Transition Temperature Covalent Adaptable Networks for Segregated-Conductive Nanocomposites

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Abstract

Covalent adaptable networks (CANs) are a unique class of healable polymers that combine the recyclability of thermoplastics with the creep and solvent resistance of thermosets. Due to their reversible covalent bonds, CANs allow for topological rearrangement when exposed to certain stimuli (light, heat, pH). As potentially recyclable replacements for high-performance thermosetting polymers, high glass transition temperature (Tg) as well as conductive CAN composites are desired. A range of high Tg CANs synthesized using poly(imide-urea) chemistry are proposed as scalable materials to meet this goal. Additionally, polymer composites utilizing segregated morphology are known to decrease their percolation thresholds (φc), reducing their overall costs. Systematic evaluation of the parameters that dictate the properties of segregated conductive composites using a low Tg polythiourethane CAN is proposed. Finally, step-growth precipitation polymerization (SG-PP) is proposed as a route to control the morphology, size, and distribution of CAN particles for easily processable segregated conductive composites.