Synthesis and Characterization of Novel Double-Functionalized Surface Modified Thermoplastic Elastomers

The Puskas group  DMR #0509687
Program officer: Dr. Andrew J. Lovinger

Dendritic (arborescent or tree-like) (polyisobutylene-polystyrene block copolymers (arbIBS) are the third generation of polyisobutylene (PIB)-based nanostructured biomaterials. The first generation from this class of polymers, linear tri-block polystyrene-$b$-polyisobutylene-$b$-polystyrene (SIBS), is FDA-approved and currently used as the polymeric coating on drug-eluting coronary stents (http://www.taxus-stent.com/#, Device Details, Interactive Overview). XPS and AFM studies of SIBS and arbIBS biomaterials demonstrated that a 10 nm layer of pure PIB segregated to the surface during self-assembly of the nanostructure. Arborescent polyisobutylene has been synthesized by inimer-type living carbocationic polymerization of a newly synthesized inimer (initiator-monomer, IM), 4-(1,2-epoxy-isopropyl)styrene with isobutylene (IB) using TiCl$_4$ as cointiator. This IM yielded arbPIBs with $M_n \sim 100,000$ g/mol with 3-8 branches. Blocking of this material with polystyrene will yield arbIBS whose surface is decorated with $-\text{OH}$ groups, further improving biocompatibility.

Students:
Elizabeth Foreman (US)
Mustafa Sen (Turkey)
Lyn Munoz Robledo (US)

PDF:
Kevin Cong (China)
Outreach Activities

The Puskas group  DMR #0509687
Program officer: Dr. Andrew J. Lovinger

International collaborators

Supporters
Polymer Engineering, Bayreuth, Germany

Lanxess
Energizing Chemistry
(Rubber Division, Bayer Inc.)

REU Program
Posters on the Hill 2006
Cortney L. Hoch

# 38895-AC7

NSF

Canada

Prof. Miroslawa El Fray

Prof. Volker Altstädt

Technical University
Szczecin, Poland

Germany

Prof. Dr. Maden (Sen. Kennedy’s office), Hoch

Billi F. Copeland (Director, McNair Scholars), Hoch, Prof. Coleen Pugh (REU Director)