CHEMICAL & BIOMEDICAL ENGINEERING SEMINAR ANNOUNCEMENT

Compatibilizer design for mechanical recycling of mixed plastic waste

Professor Chris Ellison
Lanny and Charlotte Schmidt Endowed Chair
Chemical Engineering and Materials Science
University of Minnesota

Friday, Dec. 5
11:00 a.m.
COE B221

Chris Ellison
Professor
Chemical Engineering and Materials Science
University of Minnesota

Chris Ellison is Professor and the Lanny and Charlotte Schmidt Endowed Chair, in the Department of Chemical Engineering and Materials Science at the University of Minnesota (UMN). He is also the Director of the Industrial Partnership for Research in Interfacial and Materials Engineering (called IPRIME) which connects companies from all over the world with academic researchers at UMN pursuing leading fundamental research. He has a B.S in Chemical Engineering from Iowa State University and received his Ph.D. in Chemical Engineering from Northwestern University. He started his faculty career at the University of Texas at Austin in the McKetta Department of Chemical Engineering in 2008 and then relocated to UMN in 2016. His research group focuses on polymer science and engineering, with emphasis at the intersection of polymer physics, processing and sustainability.

FAMU-FSU College of Engineering

This event sponsored by
FAMU-FSU College of Engineering
Department of Chemical & Biomedical Engineering

Mechanical recycling of plastics involves sorting, grinding, washing, and melt reprocessing plastic waste into a new form. A major challenge for mechanical recycling is imperfect physical sorting leading to impure recyclate streams that phase separate as immiscible polymer blends when melt reprocessed. The final product is usually brittle because of the sharp polymer-polymer domain interfaces that are mechanically weak. This deficiency can be overcome by copolymer compatibilizers that localize at blend component interfaces and mechanically anchor into each domain to facilitate stress transfer across the two phases producing tougher blends. In this talk, I will describe two examples of compatibilizers we developed for producing tough polyethylene terephthalate (PET)/polyethylene (PE) and polypropylene (PP)/PE blends, common pairs of polymers found together in packaging and mixed waste streams. The compatibilizers fall under two classes: preformed block copolymers that can be added to recyclates during melt reprocessing and reactive additives that produce block copolymer compatibilizers in-situ during melt reprocessing. In both cases, properly designed compatibilizers will be shown to be remarkably efficient, producing tough blends at loadings as low as 0.5 wt%, even for a variety of industrially sourced recyclates.