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Bioadvantaged thermoplastic elastomers at Iowa State University

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In this talk I will present an overview our ongoing work at Iowa State University in the area of bioadvantaged plastics; that is, plastics formed largely from biorenewable resources that offer advantages in cost and utility over their nearest petrochemically derived analogs. ISU has been a leader in this area since the pioneering work of ISU Chemistry Professor Richard LaRock, the first to convert vegetable oil into thermoset plastics and elastomers. Today, our newly formed NSF Center for Bioplastics and Biocomposites serves the interests of over 20 member companies in the development of new processes and products in the field of biobased polymeric materials. The Cochran Research Group's presence in this area began nearly four years ago with our discovery that controlled radical polymerizations such as ATRP (Atom Transfer Radical Polymerization) and RAFT (Reversible Addition-Fragmentation Chain Transfer Polymerization) can transform vegetable oils into thermoplastic rubbers. Combined with hard segments such as polystyrene or polymethylmethacrylate, we can produce block copolymers that serve the thermoplastic elastomers industry. We have since applied our technology to other biobased feed stocks, including glycerine, lignin-based phenolic residues, sugars, isosorbide, and lactic acid. This new palette of biomonomers is creating a new array of biobased thermoplastics, asphalt modifiers, sealants, adhesives, and viscosity modifiers that will find commercial success not because they are "green", but rather because they offer unique traits that their competitors cannot.

Biography

Eric W Cochran is an Associate Professor of Chemical Engineering at Iowa State University, received his PhD in Chemical Engineering from University of Minnesota in 2004. His areas of interest are in equilibrium and dynamic properties of polymeric systems that undergo self-assembly as well as the creation and development of biomaterials from renewable sources. Since his arrival to Iowa State, he has been recipient of the Camille and Henry Dreyfus New Faculty Award in 2006, of the Career Award by the NSF Division of Materials Research in 2009, and a Karen and Denny Vaughn faculty fellowship in 2011. He also currently serves as the Deputy Director of CB², the Center for Bioplastics and Biocomposites, which leverages National Science Foundation and industry funds to develop new biobased products and materials.

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