iopolymers, produced at least partially from renewable resources, have gained attention as society, industry, and governments realize the need to move away from petroleum-based materials. There are two main types of biopolymers — bioreplacement polymers and bioadvantaged polymers.

Bioreplacement polymers are produced using tools like synthetic biology and catalysis. In this approach, the polymers differ from their petroleum-based competitors only in the age of their carbon. However, achieving cost

Bioadvantaged polymers are derived from monomers nonexistent or prohibitively costly in the petrochemical world, such as alginates, cellulose, -

polysaccharides, proteins, and starch, among others. They may have physical and chemical property combinations unmatched by any material known today. These polymers present both the greatest challenges and the greatest opportunities for success.

Researchers at Iowa State Univ. (ISU) and the Center for Bioplastics and Biocomposites (CB^2), an Industry-University Cooperative Research Center funded by the National Science Foundation (NSF), are investigating bioadvantaged polymers.

Using controlled free radical polymerization chemistries, the researchers have developed a family of thermoplastic homopolymers, statistical copolymers, and thermoplastic elastomeric (TPE) block copolymers (BCPs) that employ acrylated vegetable oils and glycerol. Due to their high level of functionality and ability to copolymerize, these materials are highly tunable and can be formulated to serve a wide variety of applications.

TPE BCPs have a soft block that bridges two rigid blocks, for example, poly(styrene-b-butadiene-b-styrene) (SBS) or poly(styrene-b-isoprene-b-styrene) (SIS). The soft segments