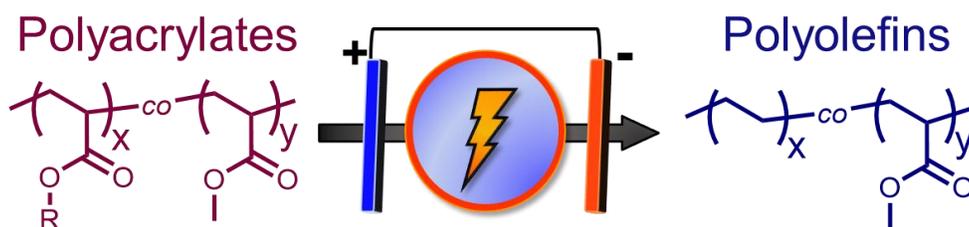


Electrifying Polymer Chemistry: New Strategies to Functionalize, Depolymerize, and Deconstruct Macromolecules

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Electrochemistry is a powerful tool to break and form challenging chemical functionality. We demonstrate that electrochemical-induced decarboxylation enables reliable post-polymerization modification and degradation of polymers. Polymers containing *N*-(acryloxy)phthalimides were subjected to electrochemical decarboxylation under mild conditions, which led to the formation of transient alkyl radicals. This enables the production of poly(ethylene-co-methyl acrylate) and poly(propylene-co-methyl acrylate) copolymers, which are difficult to synthesize by direct polymerization. Spectroscopic and chromatographic techniques reveal these transformations are near-quantitative on several polymer systems. Electrochemical decarboxylation also enables the degradation and depolymerization of all-methacrylate poly(*N*-(methacryloxy)phthalimide-co-methyl methacrylate) copolymers with high efficiencies. A deep understanding of the radical processes at place in this chemistry also inspired new approaches to polymerizing ultra-high molecular weight polymers. Taken together, this mechanistic exploration reveals how emerging radical chemistries are an important tool to generate and post-synthetically modify macromolecules.



Bio: Austin M. Evans is an organic materials chemist who is interested in controlling soft-matter at multiple length scales concurrently. Specifically, his research is targeted at designing materials to enhance environmental, energy-storage, and electronic technologies using both covalent and non-covalent approaches. Austin is passionate about chemical education, which led him to [create a scientific writing course](#) at the University of Florida. Prior to joining the faculty at the [University of Florida](#), Austin was a [Schmidt Science Fellow](#) at Columbia University where he studied organic electronic materials with Latha Venkataraman and Colin Nuckolls. Austin completed his PhD under the direction of William R. Dichtel as an NSF Graduate Research Fellow at Northwestern University, where he developed new methods to control two-dimensional polymerization. Austin originally hails from Oklahoma, where he earned his undergraduate degrees at the University of Tulsa. Outside of the lab, Austin enjoys hiking, kayaking, and appreciating the Florida wilderness.

