Acridinium-mediated photoredox catalysis and redox-active, degradable poly(phenylene sulfide)s

Presented by Nate Romero, MIT

Photoredox catalysis has come to the fore as a powerful synthetic tool with applications ranging from medicinal chemistry to materials science. At the heart of these synthetic advances is the unique reactivity patterns of organic ion radicals generated through photoinduced electron transfer, which ultimately enable reactivity and selectivity that are otherwise inaccessible through conventional two-electron pathways. The first portion of this talk will highlight work in the Nicewicz laboratory that has leveraged the activity of acridinium dyes as potent one-electron photooxidants to achieve the anti-Markovnikov hydrofunctionalization of alkenes and the C-H functionalization of arenes. A particular emphasis will be on the use of photophysical and mechanistic analysis to guide the realization of new methodology through photoredox catalyst development.

The second portion of this talk will describe recent efforts in the Swager laboratory to create functional members of the poly(phenylene sulfide) (PPS) family of polymers. PPS is a high performance thermoplastic that exhibits outstanding thermal and chemical stability, but functional derivatives with fine-tuned material properties are largely inaccessible due to challenges in synthesis and processing. We have developed alternative synthetic strategies in order to achieve new entries in the PPS family that show emergent properties, including responsive optical properties, chemical actuation, and facile degradability. These materials constitute a versatile platform for divergent access to functionalized PPS derivatives and offer applications in soft actuation and optoelectronic devices.

Hosted by Tom Rovis