Carboxylic Acids as Latent Initiators of Radical Polymerizations Mediated by Hypervalent Iodine Compounds: Synthesis of Functional Polymers and Unimolecular Micelles for Emulsification of Oils in Water

Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX

Hypervalent iodine compounds of the type $ArIL_2$ (Ar = aryl, L = "ligand", such as carboxylate, halide, etc.) participate in exchange reactions with mono-, di- or polycarboxylic acids, including acids with functional groups, yielding hypervalent iodine dicarboxylates derived from the acid. The I-O bonds in the newly formed compounds can participate in either heterolytic (nucleophilic substitution) or homolytic (carboxylate radical formation) reactions. The exchange reactions and the factors that affect their efficiency (structure of the acid, nature of the solvent, temperature) are being studied as part of this project.

Further, the applications of the exchange reactions and/or the photo- or thermal degradation of the formed iodine compounds are being utilized in the synthesis of various polymeric materials, including end-functionalized polymers (with a functional group derived from the acid), branched and hyperbranched polymers, star or graft copolymers, and dynamic (and reversibly degradable) linear or crosslinked polymers.