Synthesis and Gelation Properties of Ammonium Carboxylate Salts of Stearic Acid, 12-Hydroxystearic Acid, and their Thiol- and Disulfide-Containing Derivatives

Speaker: Danielle Beaupre
Department of Chemistry
Georgetown University

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Abstract

Molecules containing thiol and disulfide groups are ubiquitous in nature. They contribute to key biological functions, such as signaling cellular redox processes and regulating protein folding processes and conformations. More recently, synthetic thiol- and disulfide-containing materials have been used in a variety of other applications, such as to deliver anti-cancer drugs and as self-healing materials. The prevalence of these systems in nature, and their more recent adaptation to materials science derives from the relative ease of inter-conversion between the thiol (RSH) and disulfide (RSSR) forms. This talk will focus on the synthesis and gelation ability of thiol- and disulfide-containing low molecular weight organic gelators derived from 12-hydroxystearic acid (12-HSA), which is a well-known low molecular weight gelator. Low concentrations of gelator molecules in solution can self-assemble to form materials, which rheologically behave like solids. It remains difficult to predict which molecules are excellent gelators, and which solvents they will be able to gelate. Various intermolecular forces drive the self-assembly of gelator molecules within a liquid. Additional in-depth studies of the structure-property relationships that influence gelation are needed to facilitate prediction of which gelator molecules can gelate which solvents at which concentrations, temperature ranges, etc. The syntheses and properties of aggregates of a structurally related set of gelators--ammonium carboxylate salts of 12-HSA and of stearic acid (SA), and the thiol- and disulfide-containing derivatives of 12-HSA (12-TSA and 12-DSA)—will be the focus of this talk.

Biography

Danielle Beaupre is currently a chemistry Ph.D. candidate at Georgetown University in Washington, D.C. Danielle earned an associate degree in liberal arts at Manchester Community College in Manchester, CT. Thereafter, she majored in chemistry at the University of Connecticut, in Storrs, CT, where she earned her bachelor’s degree (B.S.) in 2016. Danielle joined the lab of Prof. Richard G. Weiss at Georgetown University in 2016. Danielle’s thesis research is focused on small molecules and polymers that contain thiol and disulfide groups, and she has recently authored a review on thiolated polymers and their applications.

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