Abstract: Our research centers on polymers; specifically, the design of biocompatible, biodegradable polymers that will improve human health. Given that our starting materials are naturally occurring and our polymeric bioactives safe; moreover, we incorporate green chemistry approaches to the polymer lifecycle. We have two different classes of polymers: polymers that deliver bioactives and polymers derived from bioactives. As polymers that deliver bioactives, nanoscale amphiphilic macromolecules (AMs) were initially created to encapsulate hydrophobic drugs and improve drug water-solubility and improve bioavailability. Our current work builds upon the discovery that the demonstrated that the AMs themselves are bioactive—they actively coordinate with binding domains on macrophages to mitigate formation of atherosclerotic plaques. They also display novel mechanisms for mitigating biofilm formation. As polymers derived from bioactives, PolyActives are designed to biodegrade into therapeutically useful or bioactive molecules. The first example was a poly(anhydride-esters) that yielded salicylic acid, the active component of aspirin. This concept has been expanded to include PolyAntibiotics, PolyAntiseptics and PolyOpiates useful for localized, controlled bioactive delivery for pharmaceutical, personal care, and commercial applications.

Bio: Dr. Kathryn Uhrich is currently Dean of the College of Natural & Agricultural Sciences as well as Professor of Chemistry at University of California, Riverside. She earned a Ph.D. in Organic Chemistry from Cornell University, and her B.S. in Chemistry, with honors, from the University of North Dakota. Dr. Uhrich’s research links chemistry with the life sciences and engineering disciplines to create new materials and design new devices in which polymers can be used to increase health and extend life. Widely recognized...