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Macromolecular structures that are capable of selectively and efficiently engaging cellular targets offer important approaches for mediating biological events and in the development of hybrid materials. We have employed a combination of biosynthetic tools, bioconjugation strategies, and biomimetic assembly in the design of multiple types of biopolymer conjugates of thermoresponsive (poly)peptides including those derived from sequences of resilin, elastin and collagen. PEG-biopolymer conjugates have been used in the formation of hydrogels by covalent click-based chemistries that are selectively degradable under pathological conditions. These materials can be designed to control the release of both small-molecule and macromolecular cargo with tuned release profiles, and materials with select mechanical properties have demonstrated promise for healing vascular graft materials in vivo. The incorporation of (poly)peptides affords materials that not only show controllable micro- and nanoscale morphologies, but that also have promise for targeting drug delivery to damaged tissue.

Biographical Information

Kristi Kiick is the Blue and Gold Distinguished Professor of Materials Science and Engineering at the University of Delaware, holding affiliated faculty appointments in the Departments of Biological Sciences and of Biomedical Engineering at the University of Delaware and in the School of Pharmacy at the University of Nottingham, where Kiick is conducting research as a Leverhulme Visiting Professor and Fulbright Scholar. Her internationally recognized research focuses on the synthesis, characterization, and application of protein, peptide, and self-assembled materials for applications in tissue engineering, drug delivery, and bioengineering, with specific research in cardiovascular, vocal fold, and cancer therapies. A Fellow of the American Chemical Society, she has published more than 150 articles, book chapters, and patents, and has delivered over 160 invited and award lectures. Kiick's honors have included several awards (Camille and Henry Dreyfus Foundation New Faculty, Beckman Young Investigator, NSF CAREER, DuPont Young Professor, and Delaware Biosciences Academic Research Award) as well as induction as a fellow of the American Institute for Medical and Biological Engineering, of the American Chemical Society and of the American Chemical Society Division of Polymer Chemistry. She also serves on the advisory and editorial boards for multiple international journals and research organizations. Kiick received her bachelor of science in chemistry from UD as a Eugene du Pont Memorial Distinguished Scholar, where she graduated summa cum laude, and a master of science in chemistry as an NSF graduate fellow at the University of Georgia. She worked in industry (Kimberly Clark Corporation) as a research scientist prior to obtaining master of science and doctoral degrees in polymer science and engineering at the University of Massachusetts Amherst, completing her doctoral research at the California Institute of Technology as a recipient of a National Defense Science and Engineering Graduate (NDSEG) fellowship.