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Selected links:

- [Center for Cardiovascular Biomaterials >>](#)
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Research Summary

Our research is concerned with the design and engineering of self-assembling biomimetic materials and interfacial studies at the molecular and cellular levels. Thrombosis, protein adsorption, excessive healing responses, and bacterial adhesion are major clinical problems with blood- or soft tissue - contacting devices and drug delivery systems. To address these major clinical problems, we have designed glycocalyx-like polymers (carbohydrate-rich structures) that suppress undesirable responses such as thrombosis. In a second group of biomimetic materials, cell adhesive peptides, derived from fibronectin, are incorporated to facilitate favorable endothelial - surface interactions (fig. 1). We have recently begun to develop new self-assembling materials, peptide nucleic acid polymers, that are based on exploiting DNA base pair interactions. Biomimetic approaches are also being explored in the development of targeted cell selective drug delivery (fig 2.), and for hydrogel polymers for tissue engineering applications. Our research involves molecular level design, synthesis, bulk and surface characterization studies, and on the biological side, we employ cell culture techniques, recombinant technologies, and advanced optical imaging techniques, including confocal microscopy and atomic force microscopy.

Recent Publications

- Kang I, Raghavachari M, Hofmann CM, Marchant RE, Surface-dependent Expression of the Platelet GPIb Binding Domain within Human von Willebrand Factor Studied by Atomic Force Microscopy, *Thrombosis Res.*, in press.
- MacKintosh EE, Patel JD, Marchant RE, Anderson JM, Effects of biomaterial surface chemistry on the adhesion and biofilm formation of *Staphylococcus epidermidis in vitro*, *J. Biomed. Mater. Res. A.*, 78A, 836-842, 2006.
- Larsen CC, Kligman F, Kottke-Marchant K, Marchant RE, The effect of RGD fluorosurfactant polymer modification of ePTFE on endothelial cell adhesion, growth, and function. *Biomaterials* 27, 4846-4855, 2006.
- Sen Gupta A, Link E, Wang S, Anderson EH, Hoffman C, Kottke-Marchant K, Marchant RE, Platelet Adhesion Studies on Dextran-modified Poly(vinyl amine) Surfactant Polymer Coated onto Medical Grade Polycarbonate, *Biomaterials* 27, 3084-3095, 2006.
- Zhu J, Marchant RE, Dendritic saccharide surfactant polymers as antifouling interface materials to reduce platelet adhesion, *Biomacromolecules*. 7, 1036-1041, 2006.
- Zhu J, Beamish JA, Tang C, Kottke-Marchant K, Marchant RE, Extracellular matrix-like cell-

adhesive hydrogels from RGD-containing poly(ethylene glycol) diacrylate, *Macromolecules*, 39, 1305-1308, 2006.

- Zhu J, Gosen C, Marchant RE, Synthesis and characterization of poly(vinyl amine)-based amphiphilic comb-like dextran glycopolymers by a two-step method, *J. Polym Sci, Polym Chem.*, 44, 192-199 (2006)

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