

Combinatorial Development of Biomaterials for Tissue Engineering and Drug Delivery

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Daniel Anderson received his PhD in molecular genetics from the University of California at Davis and currently holds an appointment at the David H. Koch Institute for Integrative Cancer Research at the Massachusetts Institute of Technology. He has pioneered the use of robotic methods for the development of smart biomaterials for drug delivery and tissue engineering and has developed methods allowing rapid synthesis, formulation, analysis, and biological testing of large libraries of biomaterials for use in medical devices, cell therapy and drug delivery. In particular, the advanced drug delivery systems he has designed provide new methods for nanoparticulate and microparticulate drug delivery, non-viral gene therapy, siRNA delivery, and vaccines. His work has resulted in the publication of over 120 papers, patents and patent applications, leading to a number of licenses to pharmaceutical, chemical and biotechnology companies.

Abstract

High-throughput, combinatorial approaches have revolutionized small molecule drug discovery. Here we describe our work on high-throughput methods for developing and characterizing biomaterials for drug delivery and tissue engineering. We have developed automated methods allowing for rapid nanoliter-scale synthesis of thousands of biomaterials, as well as the testing of their chemical, material, and biological properties. In particular, we have developed laser scanning cytometry methods to automate the characterization of the biological effects of synthetic surfaces. The application of this technology, as well as its use towards the discovery of new materials for cell manipulation, will be described.