Center for Affordable Nanoengineering of Polymeric Biomedical Devices

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The primary goal of the Center for Affordable Nanoengineering of Polymeric Biomedical Devices (CANPBD) is to develop polymer-based, low-cost nanomaterials and nanoengineering technology needed to produce advanced medical diagnostic devices, cell-based devices, and multifunctional polymer-nanoparticle-biomolecule nanostructures for next- generation medical and pharmaceutical applications. This provides opportunities for both scientific breakthroughs and the development of cutting edge technologies as well as novel and demonstrable interdisciplinary system integration. We have established a nanotechnology system that addresses the need for (1) fundamental science, (2) high risk technologies meeting long-term biomedical research objectives, and (3) downstream devices and nanoconstructs requiring integrated system-level effort. Two innovative 'nanofactory' systems consist of an Automated Cell to Biomolecule Analysis (ACBA) system for early cancer detection and treatment as well as a smaller Multifunctional Nanoparticle Design and Synthesis (MNDS) system for simultaneous delivery of therapeutic, imaging and probing reagents. The methods employed in this context are optical tweezers, magnetic tweezers, nanofiber-based cell sorting, label-free biodetection and nanoparticle integration. These methods involve a range of nanotechnologies and nanomaterials, while the optical tweezers and magnetic tweezers provide complementary platforms that address a broad range of biomedical needs. In addition to NSF NSEC funding, we have successfully pursued leverage grants from NSF SBIR/STTR, other funding agencies and industry through joint proposals and CANPBD spin-off companies. These provide not only commercialization pathways but also a 'blueprint' for a business plan to achieve center sustainability after Phase II funding ends.