Preface

The human body is composed of structures organized in a hierarchical fashion: from biomolecules assembled into polymers, to multimeric assemblies such as cellular organelles, to individual cells, to tissues, to organ systems working together in health and disease- each dominated by a characteristic length scale. Decades of science and engineering are now converging to provide tools that enable the orderly manipulation of biological systems at previously inaccessible, though critically important, length scales ($<$100 microns). Thus, the approaches described in this volume provide a snapshot of how micro- and nanotechnologies can enable the investigation, prevention, and treatment of human disease.

The volume is divided into three parts. The first part, *Cell-based therapeutics*; covers the merger of cells with micro- and nanosystems for applications in regenerative medicine spanning the development of novel nanobiomaterials, methods of tissue assembly with control over tissue microarchitecture, and methods to specify patterns of protein distribution that vary on the micro- and nanoscale for application in tissue regeneration (A), and therapeutic applications of integrating MEMS with cells and tissues including label-free microfluidic sorting of cells based on their function, using living cell arrays as biosensors, and micron-scale devices for surgical applications (B). The second part, *Drug Delivery*; covers intravascular delivery of nanoparticles such as semiconductor quantum dots and metal nanoshells in the context of vascular specialization or 'zip codes' (A) as well as non-vascular modes of delivery including implantation, oral, and inhalation using both encapsulated drugs as well as living cells that produce therapeutic products (B). Finally, the third part, *Molecular Surface Engineering for the Biological Interface*; covers platforms that provide enabling tools for fundamental investigations of cells in culture as they interact with biomolecular structures such as responsive biomaterials and lipid bilayers (A) as well as micropatterned adhesive and fluidic environments (B).

We would like to thank the contributing authors, our co-editors in this exciting compilation of volumes, and Dr. Mauro Ferrari for his tireless efforts to lead this endeavor. We hope the collected works will provide an excellent reference for an audience with a

diversity of background and interests including industry, students, academic researchers, policy-makers, and enthusiasts.

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