“This practical tour de force will quickly bring you up to speed on the most recent tools and techniques for controlling cellular behavior. With contributions from internationally renowned authors, readers can explore a comprehensive collection of articles tailored for scientists, research engineers, and students to learn basic and advanced micro/nanotechnology protocols. The book helps professionals understand the many intricate steps involved in micromaterial control in tissue engineering, focusing on state-of-the-art approaches for delivering soluble and substrate-based cues to cells. If you have an interest in tissue engineering or regenerative medicine, this book is a must-have!”

Prof. Jeffrey M. Karp
Brigham and Women’s Hospital, USA

Tissue engineering aims to develop biological substitutes that restore, maintain, or improve damaged tissue and organ functionality. To date, numerous stem cells and biomaterials have been explored for a variety of tissue and organ regeneration. The challenge for existing stem cell-based techniques is that current therapies lack controlled environments that are crucial for regulating stem cell engraftment and differentiation in vivo, because stem cells are rather sensitive to even minute changes in their environment. Micro- and nanotechnology hold great potential to fabricate biomimetic spatiotemporally controlled scaffolds as well as control stem cell behavior and fate by micro- and nanoscale cues.

This book presents the latest micro- and nanotechnologies used to manipulate stem cell behaviors, which is a critical area for regenerative medicine. Moreover, it covers and details cutting-edge research in nano- and microfabrication techniques and biomaterials for the regeneration of various tissues and organs, such as bone, cartilage, craniofacial, osteochondral, muscle, bladder, cardiac, and vascular tissues.

Lijie Grace Zhang is assistant professor in the Department of Mechanical and Aerospace Engineering and the Department of Medicine at the George Washington University, USA. She is also director of the Bioengineering Laboratory for Nanomedicine and Tissue Engineering at the university.

Ali Khademhosseini is associate professor at the Harvard-MIT Division of Health Sciences and Technology, Brigham and Women’s Hospital, and Harvard Medical School as well as associate faculty at the Wyss Institute for Biologically Inspired Engineering, Harvard University, USA. He is also junior principal investigator at the World Premier International—Advanced Institute for Materials Research, Tohoku University, Japan, where he directs a satellite laboratory.

Thomas J. Webster is department chair of Chemical Engineering at Northeastern University, USA. His research explores the use of nanotechnology in numerous applications.