

Handbook of Biomimetics and Bioinspiration

③ Tissue Models

Global warming, pollution, food and water shortage, cyberspace insecurity, over-population, land erosion, and an overburdened health care system are major issues facing the human race and our planet. These challenges have presented a mandate to develop "natural" or "green" technologies using nature and the living system as a guide to rationally design processes, devices, and systems. This approach has given rise to a new paradigm, one in which innovation goes hand-in-hand with less waste, less pollution, and less invasiveness to life on earth. Bioinspiration has also led to the development of technologies that mimic the hierarchical complexity of biological systems, leading to novel highly efficient, more reliable multifunctional materials, devices, and systems that can perform multiple tasks at one time. This multi-volume handbook focuses on the application of biomimetics and bioinspiration in medicine and engineering to produce miniaturized multi-functional materials, devices, and systems to perform complex tasks. Our understanding of complex biological systems at different length scales has increased dramatically as our ability to observe nature has expanded from macro to molecular scale, leading to the rational biologically-driven design to find solution to technological problems in medicine and engineering.

The following three-volume set covers the fields of bioinspired materials, electromechanical systems developed from concepts inspired by nature, and tissue models respectively.

- 1: Bioinspired Materials
- 2: Electromechanical Systems
- 3: Tissue Models

This three-volume set is a must-have for anyone keen to understand the complexity of biological systems and how that complexity can be mimicked to engineer novel materials, devices and systems to solve pressing technological challenges of the twenty-first century.

This (3) is the third and final volume. The book features engineered models of biological tissues. These include engineered matrices to mimic cancer stem cell niches; in vitro models for bone regeneration; models of muscle tissue that enable the study of cardiac infarction and myopathy; 3D models for the differentiation of embryonic stem cells; bioreactors for in vitro cultivation of mammalian cells; human lung, liver and heart tissue models; topographically defined cell culture models; ECM mimetic tissue printing; biomimetic constructs for regeneration of soft tissues; and engineered constructs for the regeneration of musculoskeletal and corneal tissue.

World Scientific
www.worldscientific.com
8169 hc

ISBN 978-981-4354-92-9 (hbk)



9 789814 354929

ISBN 978-981-4354-96-7 (v3)



9 789814 354967