Preface

Significant progress has been made in the development of neural prostheses for restoration of human functions and improvement of the quality of life. Biomedical engineers and neuroscientists around the world are working to improve the design and performance of existing devices and to develop novel devices for artificial vision, artificial limbs, and brain-machine interfaces.

This book, *Implantable Neural Prostheses 2: Techniques and Engineering Approaches*, is part two of a two-volume sequence that describes state-of-the-art advances in techniques associated with implantable neural prosthetic devices. The techniques covered include biocompatibility and biostability, hermetic packaging, electrochemical techniques for neural stimulation applications, novel electrode materials and testing, thin-film flexible microelectrode arrays, in situ characterization of microelectrode arrays, chip-size thin-film device encapsulation, microchip-embedded capacitors and microelectronics for recording, stimulation, and wireless telemetry. The design process in the development of medical devices is also discussed.

Advances in biomedical engineering, microfabrication technology, and neuroscience have led to improved medical-device designs and novel functions. However, many challenges remain. This book focuses on the engineering approaches, R&D advances, and technical challenges of medical implants from an engineering perspective. We are grateful to leading researchers from academic institutes, national laboratories, as well as design engineers and professionals from the medical device industry who have contributed to the book. Part one of this series covers designs of implantable neural prosthetic devices and their clinical applications. Devices covered include visual implants, cochlear implants, auditory midbrain implants, spinal cord stimulators, deep brain stimulators, Bion microstimulators, the brain control and sensing interface, cardiac electrostimulation devices, and magnetic stimulation devices. Regulatory approval of implantable medical devices in the United States and Europe is also discussed. We hope a better understanding of design issues, techniques, and challenges may encourage innovation and interdisciplinary efforts to expand the frontiers of R&D of implantable neural prostheses.

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