Handbook of Modern Biophysics

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Modern Tools of Biophysics

Volume 5

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Preface

The rapid growth in biophysics presents a unique challenge for educators, for they must introduce a burgeoning array of scientific ideas and tools. The "Handbook of Modern Biophysics" keeps pace with the development by introducing topics on modern tools in biophysics with a balanced format, which combines the need to understand the physical science/mathematics formalism with the demand to apprehend biomedical relevance. In the style of the past volumes, each chapter contains two major parts: The first part establishes the conceptual framework that underpins the biophysics instrumentation or technique. The second part illustrates current applications in biomedicine. With the additional sections on further reading, problems, and references, the chapter can serve as a didactic guide for interested reader to further explore different ideas.

In the fifth volume of the series "Tools of Modern Biophysics," the authors have laid down a foundation in modern Biophysics. Leighton Izu opens the book with wave theory that explains image formation in a microscope. His description and practical explanation provide a framework to understanding modern microscopy. Ye Chen Izu describes the recording of ion currents in modern experiments, especially with respect to action potential clamp and onion-peeling technique. Chao-yin Chen provides a practical view of patch clamp techniques and application. Robert Fairclough moves deeper into the molecular world and introduces anomalous low angle X-ray scattering of membrane with lanthanides. Daisuke Sato introduces to the reader computer simulation of the nonlinear dynamics observed in cardiac action potential. He shows the efficacy of using graphics processing units (GPU) in modeling the dynamics. Finally, Benjamin Chatel discusses a timely topic about the appropriate interpretation of the popular near infrared spectroscopy (NIRS) method to measure tissue oxygenation.

Volume 5 continues then the philosophy behind the "Handbook of Modern Biophysics" series and provides the reader with a conceptual grasp of current biophysics and key biomedical perspectives.

Davis, CA, USA — Thomas Jue

Contents

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