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Energy : Energy Storage

Franco, A.A., Doublet, M.L., Bessler, W.G. (Eds.)

Physical Multiscale Modeling and Numerical Simulation of Electrochemical Devices for Energy Conversion and Storage

From Theory to Engineering to Practice

- **Written by knowledgeable experts in the field**
- **Discusses the major scientific challenges of this field, such as lithium-ion batteries**
- **Highlights promising capabilities for inexpensive virtual experimentation**

The aim of this book is to review innovative physical multiscale modeling methods which numerically simulate the structure and properties of electrochemical devices for energy storage and conversion. Written by world-class experts in the field, it revisits concepts, methodologies and approaches connecting ab initio with micro-, meso- and macro-scale modeling of components and cells. It also discusses the major scientific challenges of this field, such as that of lithium-ion batteries. This book demonstrates how fuel cells and batteries can be brought together to take advantage of well-established multi-scale physical modeling methodologies to advance research in this area. This book also highlights promising capabilities of such approaches for inexpensive virtual experimentation. In recent years, electrochemical systems such as polymer electrolyte membrane fuel cells, solid oxide fuel cells, water electrolyzers, lithium-ion batteries and supercapacitors have attracted much attention due to their potential for clean energy conversion and as storage devices. This has resulted in tremendous technological progress, such as the development of new electrolytes and new engineering designs of electrode structures.

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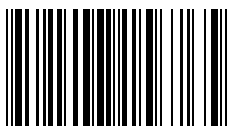
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