

Emerging Functional Materials for a Sustainable Energy Future

Edited by

Dr. Muhammad Arshad Kamran



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Emerging Functional Materials for a Sustainable Energy Future

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About this Book

This edited volume entitled “*Emerging Functional Materials for a Sustainable Energy Future*” is being published for the benefit of researchers, postgraduate students, and professionals working in materials science, physics, electrochemistry, and energy technology. It is also designed to encourage a materials-driven perspective in which improved energy-storage performance begins with a clear understanding of how materials are constructed, modified, and ultimately integrated into functional devices.

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Emerging Functional Materials for a Sustainable Energy Future

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Emerging Functional Materials for a Sustainable Energy Future

Preface

The transition toward a sustainable energy future depends not only on the expansion of renewable energy resources but also on the development of materials capable of storing and delivering energy with greater efficiency. At the heart of this challenge lies materials design. Composition, crystal structure, morphology, defects, interfaces, and charge transport collectively determine how effectively a material can perform within an energy-storage system.

Functional Materials for a Sustainable Energy Future brings together focused contributions that examine these relationships from the perspective of advanced functional materials. The chapters address fundamental principles of electrode design and electrochemical energy storage, followed by investigations of Fe-doped cobalt molybdenum oxide, Sr-doped manganese sulfide, Co-doped zinc molybdenum oxide, and SrS/graphitic carbon nitride nanocomposites. Together, these studies illustrate how controlled modification of composition and structure can influence conductivity, active sites, charge-transfer kinetics, and electrochemical performance.

Considerable emphasis is placed on practical materials-engineering approaches, including elemental doping, nanostructure development, hydrothermal synthesis, interface formation, and hybridization. These strategies are presented not simply as preparation techniques, but as means of establishing meaningful connections between material structure and functional behavior.

This book is intended for researchers, postgraduate students, and professionals working in materials science, physics, electrochemistry, and energy technology. It is also designed to encourage a materials-driven perspective in which improved energy-storage performance begins with a clear understanding of how materials are constructed, modified, and ultimately integrated into functional devices.

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Peer Review Statement

All the chapters in this book are peer-reviewed following the procedure outlined below.

Primary Evaluation: The volume editor conducted a preliminary evaluation of the submitted chapters and rejected those that contain significant scientific flaws or fall outside the scope of the book. The manuscripts were also screened for instances of plagiarism. At this stage, manuscripts with high similarity index were rejected. There was an opportunity for authors to revise and resubmit manuscripts with language issues, grammatical errors, and inadequate originality. Those that met the minimum requirements were forwarded to experts for review. The authors of rejected manuscripts at this stage are notified with the decision.

Double Blind Peer Review: Each chapter undergoes a thorough evaluation process and is reviewed by at least two specialists in the field of expertise by following the double-blind peer review process. The volume editor invited two to five reviewers for each chapter based on their respective areas of expertise. The reviewers were tasked with evaluating the manuscript and composing a report by providing critiques on both, strength as well as weakness of the chapter. Reviewers were asked to advise the editor, whether to accept the submitted chapter or not. In addition, they were requested to provide suggestions or alterations to enhance the quality of the chapter. After receiving the insightful Review Report from at least 2 reviewers, the editor made the final decision regarding the manuscript's acceptance or revision or rejection and communicate it to the author, along with any recommendations made by the reviewers.

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