1. Record Nr. UNINA9910815190203321

Titolo	Electrochemical technologies for energy storage and conversion . Volume 1 / / edited by Ru-Shi Liu ... [et al.]
Pubbl/distr/stampa	Weinheim, Germany, : Wiley-VCH, 2012
ISBN	9783527640072 352764007X 9783527639496 3527639497 9783527640089 3527640088
Edizione	[1st ed.]
Descrizione fisica	1 online resource (825 p.)
Collana	Electrochemical technologies for energy storage and conversion ; ; v. 1
Altri autori (Persone)	LiuRu-Shi
Disciplina	621.3124 621.31242
Soggetti	Energy storage Energy conversion Electrochemistry
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Electrochemical Technologies for Energy Storage and Conversion; Contents to Volume 1; Contents to Volume 2; Preface; About the Editors; List of Contributors; 1 Electrochemical Technologies for Energy Storage and Conversion; 1.1 Introduction; 1.2 Global Energy Status: Demands, Challenges, and Future Perspectives; 1.3 Driving Forces behind Clean and Sustainable Energy Sources; 1.3.1 Local Governmental Policies as a Potential Thrust; 1.3.2 Greenhouse Gases Emission and the Associated Climate Changes; 1.3.3 Public Awareness about Environmental Protection Rose around the World 1.3.4 Population Growth and Industrialization1.3.5 Security and Safety Concerns Arising from Scarcity of Resources; 1.3.6 Platforms Advocating in Favor of Sustainable and Renewable Resources; 1.3.7 Economic Risk Generated from Price Pressure of Natural Resources; 1.3.8 Regulatory Risk from Governmental Action and Legislation; 1.3.9 Fear of Reputational Risk to Strengthen Corporate Social Responsibility;

1.3.10 Operational and Supply Chain Risks from Inefficiencies and Environmental Changes
1.4 Green and Sustainable Energy Sources and Their Conversion: Hydro, Biomass, Wind, Solar, Geothermal, and Biofuel1.4.1 Solar PV Plants; 1.4.2 Wind Power; 1.4.3 Geothermal Power; 1.4.4 Concentrating Solar Thermal Power (CSP) Plants; 1.4.5 Biomass; 1.4.6 Biofuel; 1.5 Electrochemistry: a Technological Overview; 1.6 Electrochemical Rechargeable Batteries and Supercapacitors (Li Ion Batteries, Lead-Acid Batteries, NiMH Batteries, Zinc-Air Batteries, Liquid Redox Batteries); 1.6.1 Lead-Acid Batteries; 1.6.2 NiMH Batteries; 1.6.3 Li-Ion Batteries; 1.6.4 Zinc-Air Batteries
1.6.5 Liquid Redox Batteries1.7 Light Fuel Generation and Storage: Water Electrolysis, Chloro-Alkaline Electrolysis, Photoelectrochemical and Photocatalytic H2 Generation, and Electroreduction of CO2; 1.7.1 Water Electrolysis; 1.7.2 Electrochemistry of Water Splitting; 1.7.3 Chlor-Alkaline Electrolysis; 1.7.4 Photoelectrochemical and Photocatalytic H2 Generation; 1.7.5 Carbon Dioxide Reduction; 1.8 Fuel Cells: Fundamentals to Systems (Phosphoric Acid Fuel Cells, PEM Fuel Cells, Direct Methanol Fuel Cells, Molten Carbon Fuel Cells, and Solid Oxide Fuel Cells); 1.8.1 Alkaline Fuel Cells
1.8.2 Direct Methanol Fuel Cells1.8.3 Phosphoric Acid Fuel Cells (PAFCs); 1.8.4 Proton Exchange Membrane Fuel Cells; 1.8.5 High-Temperature Molten Carbonate Fuel Cells; 1.8.6 Solid Oxide Fuel Cells; 1.9 Summary; Acknowledgments; References; Further Reading; 2 Electrochemical Engineering Fundamentals; 2.1 Electrical Current/Voltage, Faraday's Laws, Electric Efficiency, and Mass Balance; 2.1.1 Current Efficiency; 2.1.2 Mass Balance; 2.2 Electrode Potentials and Electrode-Electrolyte Interfaces; 2.2.1 Potential Difference; 2.2.2 Electrode-Electrolyte Interfaces
2.3 Electrode Kinetics (Charger Transfer (Butler-Volmer Equation) and Mass Transfer (Diffusion Laws))

Sommario/riassunto

In this handbook and ready reference, editors and authors from academia and industry share their in-depth knowledge of known and novel materials, devices and technologies with the reader. The result is a comprehensive overview of electrochemical energy and conversion methods, including batteries, fuel cells, supercapacitors, hydrogen generation and storage as well as solar energy conversion. Each chapter addresses electrochemical processes, materials, components, degradation mechanisms, device assembly and manufacturing, while also discussing the challenges and perspectives for each energy sto