

1. Record Nr.	UNINA9911020452203321
Autore	Zou Guoqiang
Titolo	Sodium-Ion Capacitors : Mechanisms, Materials, and Technologies
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2023 ©2024
ISBN	9783527837342 3527837345 9783527837366 3527837361
Edizione	[1st ed.]
Descrizione fisica	1 online resource (275 pages)
Altri autori (Persone)	JiXiaobo HouHongshuai
Disciplina	621.315
Soggetti	Energy storage Sodium
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Preface -- Chapter 1 Introduction -- 1.1 A Brief Development of SICs -- 1.2 Comparison Between Different Hybrid Ion Capacitors -- 1.3 SICs Energy Storage Mechanism Introduction -- 1.4 Key Technologies of SICs -- References -- Chapter 2 Characteristics of Sodium Ion Capacitor Devices -- 2.1 Basic Features -- 2.2 Working Principle -- 2.3 Equations -- References -- Chapter 3 Fundamental Understanding of Sodium Ion Capacitors Mechanism -- 3.1 EDLC Type Mechanism of SCs and Battery Type Mechanism of SIBs -- 3.2 Pseudocapacitance Mechanism -- 3.2.1 Motivation for the Search for Pseudocapacitance -- 3.2.2 Definition and Types of Pseudocapacitance -- 3.2.3 Energy Storage Mechanism of Pseudocapacitors -- 3.2.3.1 Adsorption Pseudocapacitance -- 3.2.3.2 Redox Pseudocapacitance -- 3.2.3.3 Intercalation Pseudocapacitance -- 3.2.4 Pseudocapacitance Electrode Materials -- 3.2.4.1 Conductive Polymer -- 3.2.4.2 MXene -- 3.2.4.3 Pseudocapacitive Materials for Comparison -- 3.2.5 Evolution of Pseudocapacitance -- 3.2.6 Electrochemical Features of Pseudocapacitance -- References -- Chapter 4 Classification of Sodium-Ion Capacitors Cell Configurations

-- 4.1 BatteryType Anode and EDLC Cathode SICs Cell Configurations -- 4.2 BatteryType Anode and Pseudocapacitive Cathode SICs Cell Configurations -- 4.3 EDLC Anode and BatteryType Cathode SICs Cell Configurations -- 4.4 Pseudocapacitive Anode and BatteryType Cathode SICs Cell Configurations -- 4.5 Capacitive Anode and Hybrid Cathode SICs Cell Configurations -- 4.6 Summary -- References -- Chapter 5 Cathode Materials for SodiumIon Capacitors -- 5.1 Introduction -- 5.2 EDLC Cathode Materials -- 5.2.1 0D Carbonaceous Cathodes -- 5.2.2 1D Carbonaceous Cathodes -- 5.2.2.1 Carbon Nanotubes -- 5.2.2.2 Carbon Nanofibers -- 5.2.3 2D Carbonaceous Cathodes. 5.2.3.1 Reduced Graphene Oxide -- 5.2.3.2 Carbon Nanosheets -- 5.2.4 3D Carbonaceous Cathodes -- 5.2.4.1 Hollow Carbon Microspheres -- 5.2.4.2 Activated Hard Carbon -- 5.2.4.3 Disorder Carbon -- 5.2.4.4 Folded Carbon -- 5.3 Pseudocapacitive Cathode Materials -- 5.3.1 Adsorption Pseudocapacitive Materials -- 5.3.2 Redox Pseudocapacitive Materials -- 5.3.2.1 Conductive Polymers -- 5.3.2.2 VanadiumBased Materials -- 5.3.3 Intercalation Pseudocapacitive Materials -- 5.4 BatteryType Cathode Materials -- 5.4.1 $\text{NaMn}_{1/3}\text{Co}_{1/3}\text{Ni}_{1/3}\text{PO}_4$ Cathodes -- 5.4.2 $\text{Na}_3\text{V}_2(\text{PO}_4)_3$ Cathodes -- 5.4.3 $\text{Na}_3\text{V}_2\text{O}_2(\text{PO}_4)_2\text{F}$ Cathodes -- 5.4.4 Sodium Transition Metal Oxides Cathodes -- 5.4.4.1 $\text{Na}_{0.67}(\text{Mn}_{0.75}\text{Al}_{0.25})\text{O}_2$ -- 5.4.4.2 $\text{Na}_{0.67}\text{Co}_{0.5}\text{Mn}_{0.5}\text{O}_2$ -- 5.4.4.3 $\text{Na}_{0.5}\text{Mn}_{0.5}\text{Co}_{0.48}\text{Mg}_{0.02}\text{O}_2$ -- 5.4.4.4 $\text{Na}_{0.66}\text{Mn}_{0.54}\text{Ni}_{0.13}\text{Co}_{0.13}\text{O}_2$ -- References -- Chapter 6 Anode Materials for SodiumIon Capacitors -- 6.1 EDLC Anode Materials -- 6.2 Pseudocapacitive Anode Materials -- 6.3 BatteryType Anode Materials -- 6.3.1 Intercalation Materials -- 6.3.1.1 Carbonaceous Anode -- 6.3.1.2 TitaniumBased Compound -- 6.3.1.3 NiobiumBased Compound -- 6.3.1.4 VanadiumBased Oxide -- 6.3.1.5 Other New Intercalation Anodes -- 6.3.2 Conversion Materials -- 6.3.2.1 Metal Oxides -- 6.3.2.2 Metal Sulfides -- 6.3.2.3 Metal Selenides -- 6.3.3 Alloying Materials -- 6.3.3.1 SnBased Anode -- 6.3.3.2 Sb Anode -- 6.3.3.3 Bi Anode -- 6.4 Other Novel Materials -- References -- Chapter 7 Flexible SodiumIon Capacitor Devices -- 7.1 Flexible SICs Devices -- 7.1.1 Flexible BatteryType Anode and Capacitive Cathode SICs Cell Configurations -- 7.1.1.1 Flexible Electrodes Based on Carbon Nanofiber -- 7.1.1.2 Flexible Electrodes Based on Graphene Substrates -- 7.1.1.3 Flexible Electrodes Based on Carbon Cloth -- 7.1.1.4 Flexible Electrodes Based on MXenes -- 7.1.1.5 Flexible Electrodes Based on Metal Foil. 7.2 Flexible Capacitive Anode and BatteryType Cathode SICs Cell Configurations -- 7.3 Electrolytes in Flexible SICs Devices -- References -- Chapter 8 Presodiation Technologies -- 8.1 Introduction -- 8.2 Prelithiation in LithiumIon Batteries -- 8.2.1 Operation with Li Metal -- 8.2.2 Usage of LiBased Alternatives -- 8.2.3 Supply of Extra Additives -- 8.3 Presodiation in SodiumIon Batteries -- 8.3.1 Operation with Na Metal -- 8.3.2 Usage of NaBased Alternatives -- 8.3.3 Supply of Extra Additives -- 8.4 Presodiation in SodiumIon Capacitors -- 8.4.1 Electrochemical Method -- 8.4.2 Alternatives Method -- 8.4.3 Sacrificial Additives Method -- References -- Chapter 9 Conclusions and Future Perspective -- 9.1 Definitions and Mechanisms -- 9.2 Configurations -- 9.3 Electrode Materials -- 9.4 Key Technologies -- 9.5 Future Perspective -- Index -- EULA.

Sommario/riassunto

This book provides a comprehensive overview of sodium-ion capacitors (SICs), focusing on their mechanisms, materials, and technologies. Edited by Guoqiang Zou, Xiaobo Ji, and Hongshuai Hou, it covers the development of SICs, their device configurations, and detailed discussions on cathode and anode materials. The book aims to address

challenges such as limited energy density and technological research stages of SICs. It also explores flexible SIC devices and pre-sodiation technologies. Targeted at researchers and professionals in energy storage and battery technology, the book offers guidelines for constructing advanced SICs to meet the needs of high energy density and power applications.
