Supercapacitors: Materials, Systems, and Applications
Max Lu (Series Editor), Francois Beguin (Editor), Elzbieta Frackowiak (Editor)

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DESCRIPTION

Supercapacitors are a relatively new energy storage system that provides higher energy density than dielectric capacitors and higher power density than batteries. They are particularly suited to applications that require energy pulses during short periods of time, e.g., seconds or tens of seconds. They are recommended for automobiles, tramways, buses, cranes, fork-lifts, wind turbines, electricity load leveling in stationary and transportation systems, etc. Despite the technological maturity of supercapacitors, there is a lack of comprehensive literature on the topic. Many high performance materials have been developed and new scientific concepts have been introduced. Taking into account the commercial interest in these systems and the new scientific and technological developments now is the ideal time to publish this book, capturing all this new knowledge. The book starts by giving an introduction to the general principles of electrochemistry, the properties of electrochemical capacitors, and electrochemical characterization techniques. Electrical double layer capacitors and pseudocapacitors are then discussed, followed by the various electrolyte systems. Modelling, manufacture of industrial capacitors, constraints, testing, and reliability as well as applications are also covered. 'Supercapacitors - Materials, Systems, and Applications' is part of the series on Materials for Sustainable Energy and Development edited by Prof. G.Q. Max Lu. The series covers advances in materials science and innovation for renewable energy, clean use of fossil energy, and greenhouse gas mitigation and associated environmental technologies.
François Béguin is Professor of Materials Chemistry at Orléans University, France. His research activities are devoted to chemical and electrochemical applications of carbon materials, with special attention to the development of nano-carbons with controlled porosity and surface functionality for applications in energy conversion/storage and environment protection. He has published over 230 papers, owns several patents, and his works have been cited over 3000 times. Béguin is the Director of two national programmes in the French Agency for Research (ANR), one on Energy Storage (Stock-E), the other on Hydrogen and Fuel Cells (H-PAC).

Elzbieta Frackowiak is a full professor at Poznan University of Technology, Poland. She is an electrochemist, with research interests focused on energy storage/conversion. Frackowiak has more than 150 publications and 2800 citations to her name, and is Chair Elect of Division 3 (Electrochemical Energy Conversion and Storage) of the International Society of Electrochemistry.

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