Preface

This book deals with the fabrication and working principle of electrochemical capacitors taking into account the current energy crisis and requirement of highly efficient and long-term energy storage solution. Besides alternatives like rechargeable batteries, electrochemical capacitors could help in addressing the global remedy for cleaner, greener and safer energy storage. This would not only preserve the already depleting non-renewable energy resources (and the environmental hazards resulting out of their consumption) but also provide much required support for renewable energy harvesting resources (i.e. solar, wind, hydro and geothermal).

Though electrochemical capacitors have extraordinary charge accumulation capabilities in comparison to conventional dielectric capacitors, they lag behind rechargeable batteries when it comes to energy per weight ratio (energy density). Therefore, urgent attention is required for further development and optimisation so as to achieve higher energy density in currently available electrochemical capacitors. To accomplish this objective, the book closely examines various important parameters controlling the fabrication and characterisation of electrochemical capacitors of various forms. From these analyses, readers can investigate the role of key components such as electrode/electrolyte materials, separators, current collector and binders on the energy storage performance of electrochemical capacitors.

The first part of this book furnishes detailed emphasis on background, classification, principle of charge storage in electrochemical capacitors. Rest of the discussion is focussed to the current limitations and possible strategies to overcome the same. This book has been written keeping in mind that the broad readership would be graduate students, academic researchers and industries involved in sustainable energy and growth. No other publication has addressed these areas so comprehensively, and therefore, this book can be considered to be highly original in content, with no competing texts.

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