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High-performance secondary batteries, also called rechargeable or storage batteries, are a key component of electric automobiles, power storage for renewable energies, load levellers of electric power lines, base stations for mobile phones, and emergency power supply in hospitals, in addition to having application in energy security and realization of a low-carbon and resilient society. A detailed understanding of the physics and chemistry that occur in secondary batteries is required for developing next-generation secondary batteries with improved performance.

Among various types of secondary batteries, lithium-ion batteries are most widely used because of their high energy density, small memory effect, and low self-discharge rate. This book introduces lithium-ion batteries, with an emphasis on their overview, roadmaps, and simulations. It also provides extensive descriptions of ion beam analysis and prospects for in situ diagnostics of lithium-ion batteries. The chapters are written by specialists in cutting-edge research on lithium-ion batteries and related subjects. The book will be a great reference for advanced undergraduate- and graduate-level students, researchers, and engineers in electrochemistry, nanotechnology, and diagnostic methods and instruments.



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