

Advanced Fluoride-Based Materials for Energy Conversion

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Advanced Fluoride-Based Materials for Energy Conversion provides thorough and applied information on new fluorinated materials for chemical energy devices, exploring the electrochemical properties and behavior of fluorinated materials in lithium ion and sodium ion batteries, fluoropolymers in fuel cells, and fluorinated carbon in capacitors, while also exploring synthesis applications, and both safety and stability issues.

As electronic devices, from cell phones to hybrid and electric vehicles, are increasingly common and prevalent in modern lives and require dependable, stable chemical energy devices with high-level functions are becoming increasingly important. As research and development in this area progresses rapidly, fluorine compounds play a critical role in this rapid progression. Fluorine, with its small size and the highest electronegativity, yields stable compounds under various conditions for utilization as electrodes, electrolytes, and membranes in energy devices.

The book is an ideal reference for the chemist, researcher, technician, or academic, presenting valuable, current insights into the synthesis of fluorine compounds and fluorination reactions using fluorinating agents.

- Provides thorough and applied information on new fluorinated materials for chemical energy devices
- Describes the emerging role of stable energy devices with high-level functions and the research surrounding the technology
- Ideal for the chemist, research, technician, or academic seeking current insights into the synthesis of fluorine compounds and fluorination reactions using fluorinating agents

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Editorial Review

From the Back Cover

In 1973, the importance of fluorine compounds as energy materials was recognized by using graphite fluorides, (CF)n, as positive electrodes in primary lithium batteries. Since then, efforts have been made to use fluorinated materials in all the constituents of a battery. *Advanced Fluoride-Based Materials for Energy Conversion* describes advanced information on fluoride-based materials for energy storage. In connection with their exceptional properties, fluorinated materials offer a vast panel of uses in electrochemical storage devices such as lithium-ion batteries, fuel cells, and capacitors. It also shows the fundamental properties and unique functions of fluorinated compounds to highly improve the electrochemical performance of such energy storage devices. This book also focuses on new and promising batteries, such as sodium- and fluoride-ion batteries, and also reviews newer fluorinated compounds used as fluorinated binder, electrolyte, additives, etc., in commercial storage devices. This book is suitable for students, researchers, and engineers working in chemistry, materials science, and electrical engineering.

Key features:

- Discusses the unique functions of fluorine in energy materials
- Demonstrates that fluorine compounds and fluorination techniques are useful for batteries, fuel cells, and capacitors
- Offers advanced information on fluorinated binder, electrolyte, additives materials for batteries, fuel cells, and capacitors

About the Author

Tsuyoshi Nakajima is Professor in the Department of Applied Chemistry, Aichi Institute of Technology in Japan. He has worked on fluorine chemistry and electrochemistry (that is, fluorinated materials) for primary and rechargeable lithium batteries, and fluorine-, fluoride-, or oxyfluoride-graphite intercalation compounds. Li/(CF)n battery is the first primary lithium battery commercialized on the basis of the research on graphite fluoride which was performed in his laboratory at Kyoto University. His research was on the discharge mechanism of Li/(CF)n battery and synthesis of graphite fluoride, (CF)n with excellent discharge performance. The importance of carbon-fluorine compounds as battery materials was first recognized by graphite fluoride cathode of Li/(CF)n battery. Furthermore, new graphite anode for electrolytic production of fluorine gas was developed on the basis of his work on fluorine-graphite intercalation compound with high electrical conductivity. Recently. his research interest is on the application of fluorine chemistry to rechargeable lithium batteries. Fluorination techniques were applied to surface modification of graphite anode which increases the capacities of graphite anode and enables the low temperature operation of lithium ion battery. For the application of lithium ion battery using flammable organic solvents to electric sources of hybrid and electric vehicles, high safety is the most important issue. He has found that organo-fluorine compounds are excellent new solvents with high oxidation stability (that is, high safety for rechargeable lithium batteries). He published about 230 papers and 24 books. In academic societies, he served as chairman of JSPS 155th Committee on Fluorine Chemistry; The Society of Fluorine Chemistry, Japan; Executive Committee of Carbon Society of Japan; and Regional Editor and Editorial Board of J. Fluorine Chemistry.

Henri Groult is Director of Research of CNRS-UPMC-ESPCI UMR 7612, University of Pierre and Marie Curie (Paris 6) in France. He has devoted his research life to fluorine chemistry, electrochemistry, and

molten salt chemistry. His main research subjects are electrolytic production of fluorine gas, fluorine compounds for primary and secondary lithium batteries, and electrochemical properties of molten fluorides and chlorides. He has obtained interesting results on fluorine evolution reaction on carbon electrodes, discharge behavior of carbon-fluorine compounds, charge/discharge characteristics of metal fluorides, and electrochemical properties of molten salts. On these subjects, he published more than 100 papers and 7 books. His activity has played an important role in fluorine chemistry in France. He has served as Director of the French Network of Fluorine, Chairman of the 17th European Symposium on Fluorine Chemistry (Paris, July 2013), and Editorial board of J. Fluorine Chemistry.

Users Review

From reader reviews:

Eric Johnson:

Why don't make it to become your habit? Right now, try to prepare your time to do the important take action, like looking for your favorite guide and reading a guide. Beside you can solve your condition; you can add your knowledge by the publication entitled Advanced Fluoride-Based Materials for Energy Conversion. Try to the actual book Advanced Fluoride-Based Materials for Energy Conversion as your good friend. It means that it can to become your friend when you sense alone and beside associated with course make you smarter than before. Yeah, it is very fortuned to suit your needs. The book makes you a lot more confidence because you can know almost everything by the book. So , we should make new experience and knowledge with this book.

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Michele Williams:

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Melinda Brown:

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