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Nota di contenuto	LITHIUM BATTERIES; CONTENTS; CONTRIBUTORS; PREFACE; CHAPTER 1 ELECTROCHEMICAL CELLS: BASICS; 1 ELECTROCHEMICAL CELLS AND ION TRANSPORT; 2 CHEMICAL AND ELECTROCHEMICAL POTENTIAL; 2.1 Temperature Dependence of the Reversible Cell Voltage; 2.2 Chemical Potential; 2.3 Electrochemical Potential; 2.4 The Nernst Equation; 2.5 Electrochemical Double Layer; 3 OHMIC LOSSES AND ELECTRODE KINETICS; 3.1 Ohmic Potential Losses; 3.2 Kinetic Overpotential; 3.3 The Butler-Volmer Equation; 4 CONCLUDING REMARKS; BIBLIOGRAPHY; CHAPTER 2 LITHIUM BATTERIES: FROM EARLY STAGES TO THE FUTURE; 1 INTRODUCTION 2 ADVENT OF THE RECHARGEABLE LITHIUM BATTERY 3 A LOOK INTO THE FUTURE; 4 BEYOND THE HORIZON; REFERENCES; CHAPTER 3 ADDITIVES IN ORGANIC ELECTROLYTES FOR LITHIUM BATTERIES; 1 INTRODUCTION; 1.1 Shortcomings of Standard Liquid or Gel Electrolytes; 1.2 The Advent of Additives; 1.3 Additive Criteria and

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5 SYNERGY EFFECTS BETWEEN ELECTROLYTE ADDITIVES 5.1 Double-Functionality Additives; 5.2 Synergies of Single-Functionality Additives;

6 CONCLUSIONS; REFERENCES; CHAPTER 4 ELECTROLYTES FOR LITHIUM-ION BATTERIES WITH HIGH-VOLTAGE CATHODES; 1 INTRODUCTION; 2 OXIDATION REACTIONS OF THE ELECTROLYTE WITH TRADITIONAL METAL OXIDE CATHODE MATERIALS; 3 THERMAL REACTIONS OF THE ELECTROLYTE WITH THE SURFACE OF METAL OXIDE CATHODES; 4 FORMULATION OF ELECTROLYTES FOR HIGH-VOLTAGE MATERIALS; 4.1 Chemistry of Cathodes at High Voltage

4.2 Novel Organic Solvents with Greater Oxidative Stability: Sulfones, Nitriles, and Fluorinated Solvents 4.3 Novel Additives for Cathode Surface Passivation; 5 SUMMARY; REFERENCES; CHAPTER 5 CORE-SHELL STRUCTURE CATHODE MATERIALS FOR RECHARGEABLE LITHIUM BATTERIES; 1 INTRODUCTION; 2 LAYER-STRUCTURED CORE-SHELL; 3 LAYER-STRUCTURED CORE-SHELL PARTICLES WITH A CONCENTRATION GRADIENT; 4 SPHERICAL CORE-SHELL $\text{Li}[(\text{Li}_{0.05}\text{Mn}_{0.95})_{0.8}(\text{Ni}_{0.25}\text{Mn}_{0.75})_{0.2}]\text{O}_4$ SPINEL; 5 CONCLUSIONS; Acknowledgments; REFERENCES;

CHAPTER 6 PROBLEMS AND EXPECTANCY IN LITHIUM BATTERY TECHNOLOGIES; 1 INTRODUCTION

2 IMPORTANCE OF ENERGY STORAGE 3 DEVELOPMENT OF LITHIUM BATTERIES; 3.1 Lithium Batteries for Electric Vehicles; 3.2 Lithium Batteries for Mobile Applications; 4 DEVELOPMENT OF MATERIALS FOR RECHARGEABLE LITHIUM BATTERIES; 4.1 Safety; 4.2 Lifetime; 4.3 High Energy Density; 4.4 Cathode Materials; 4.5 Anode Materials; 4.6 Electrolytes; 5 PRODUCTION OF ELECTRODES FOR LITHIUM BATTERIES; 5.1 Energy and Power Density; 5.2 Particle Nature; 5.3 Composite Electrodes; 5.4 Current Collectors; 6 SUMMARY; REFERENCES; CHAPTER 7 FLUORINE-BASED POLYANIONIC COMPOUNDS FOR HIGH-VOLTAGE ELECTRODE MATERIALS

1 INTRODUCTION

Sommario/riassunto

Explains the current state of the science and points the way to technological advances First developed in the late 1980's, lithium-ion batteries now power everything from tablet computers to power tools to electric cars. Despite tremendous progress in the last two decades in the engineering and manufacturing of lithium-ion batteries, they are currently unable to meet the energy and power demands of many new and emerging devices. This book sets the stage for the development of a new generation of higher-energy density, rechargeable lithium-ion batteries by advancing battery chemical