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| Nota di contenuto       | Graphene-based Energy Devices; Contents; List of Contributors; Preface; Chapter 1 Fundamental of Graphene; 1.1 Introduction; 1.2 Synthesis of Graphene; 1.2.1 Mechanical Cleavage; 1.2.2 Epitaxial Growth; 1.2.3 CVD Growth of Graphene; 1.2.4 Solution-Based Graphene; 1.2.4.1 Ultrasonication; 1.2.4.2 Intercalation; 1.2.4.3 Chemical Exfoliation; 1.2.5 Synthesis of Composite Material Based on Graphene Oxide; 1.3 Characterization of Graphene; 1.3.1 AFM (Atomic Force Microscopy); 1.3.2 SEM; 1.3.3 TEM/SEAD/EELS; 1.3.4 XPS; 1.3.5 XRD; 1.3.6 Raman; 1.3.7 Photoluminesces (PL) Measurement<br>1.4 Optical Property Modification of Graphene<br>1.4.1 Absorption Property Modification of Graphene (Terahertz, UV-Visible-NIR); 1.4.1.1 Absorption Property of Thermally Annealed Graphene Oxide; 1.4.1.2 Absorption Property Plasma Defected Graphene; 1.4.2 PL Property Modification of Graphene; 1.4.2.1 PL Properties of Oxygen Plasma Treated Graphene; 1.4.2.2 Substrate Effect; 1.4.2.3 Pd Grafted Graphene Oxide; 1.5 Optoelectric Application of Graphene; References; Chapter 2 Graphene-Based Electrodes for Lithium Ion Batteries; 2.1 Introduction; 2.2 The Working Principle of LIBs<br>2.3 Graphene-Based Cathode Materials for LIBs<br>2.4 Graphene-Based Anode Materials for LIBs; 2.4.1 Graphene as Anodes for LIBs; 2.4.2 |

Graphene-Based Composites as Anodes for LIBs; 2.4.2.1 The Lithium Storage Mechanisms of Anode Materials; 2.4.2.2 Graphene-Si/Sn Composites as Anodes for LIBs; 2.4.2.3 Graphene-Metal Oxide Composites as Anodes for LIBs; 2.4.2.4 Graphene-TiO<sub>2</sub>/MoS<sub>2</sub> Composites as Anodes for LIBs; 2.5 Two-Dimensional (2D) Flexible and Binder-Free Graphene-Based Electrodes; 2.5.1 Graphene-Based Flexible Anode Materials for LIBs; 2.5.1.1 2D Flexible and Binder-Free Graphene Electrodes  
2.5.1.2 2D Flexible and Binder-Free Graphene-Based Hybrid Anode Electrodes  
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5.3 Graphene-Based Electrodes for Supercapacitors

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#### Sommario/riassunto

The book starts out with a brief overview of the fundamentals of graphene, including the main synthesis techniques, characterization methods and properties. The first main part is concerned with graphene for energy storage applications such as lithium-ion batteries, supercapacitors and hydrogen storage. The second part covers graphene-based energy-generation devices, in particular conventional as well as microbial and enzymatic fuel cells. Concluding chapters on graphene photovoltaics round off the book. In all chapters not only the device architectures on a laboratory scale will be discussed,

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