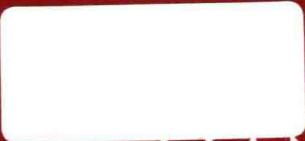


World Scientific Series on Carbon Nanoscience



HANDBOOK OF CARBON NANO MATERIALS

Volume 6

Graphene — Energy and Sensor Applications

Editors

Francis D'Souza

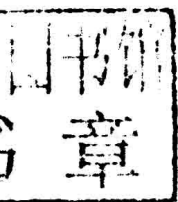
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Volume 6

Graphene — Energy and Sensor Applications



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(In 2 Volumes)

Volume 6: Graphene — Energy and Sensor Applications

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HANDBOOK OF CARBON NANO MATERIALS

Volume 6

Graphene — Energy and Sensor Applications

Preface

We are pleased to present the third two-volume set of *The Handbook of Carbon Nanomaterials*. What started out to be a one-time publication of a “*Handbook*” set to mark the 25th anniversary of the discovery of Fullerenes in 2011, now appears to be a successful publication series. This is primarily due to the multiple new discoveries which continue to be published on the basic properties and applications of fullerenes, carbon nanotubes and graphene materials.

The first published set of volumes in the *Handbook of Carbon Nanomaterials* comprised 23 chapters in two volumes which summarized research developments in the field of carbon nanomaterials as seen through the eyes of more than three dozen leading researchers from around the world. The topics covered four general areas. The first part of the book dealt with the chemistry of fullerenes and carbon nanotubes, including organic functionalization, reactivity, perfluoroalkylation, and fullerenes linked to photosensitizers. The second part covered the chemistry and physics of endohedral fullerenes. The third part of the book covered the molecular and supramolecular chemistry of fullerenes and carbon nanotubes while the fourth described topics related to photoinduced energy and electron transfer. Finally, applications of fullerenes, carbon nanotubes and graphenes as applied to organic molecular electronics, polymers composites, thermal conductive materials, photovoltaics and sensing were presented.

The second published set of volumes in the *Handbook of Carbon Nanomaterials* (Volumes 3 and 4) contained material from leading authors on medicinal and bio-related applications and on topics ranging from materials to fundamental applications. Specific topics covered in Volume 3 were fullerenes in biology and medicine, the current state of the art of toxicity studies of fullerenes and carbon nanotubes, methods of detection of carbon nanotubes in living cells, carbon nanotechnology in regenerative medicine, chemical and biochemical sensors based on carbon nanotubes, molecular recognition

approach for separating left- and right-handed structures of single wall carbon nanotubes and open cage fullerene. The specific topics covered in Volume 4 were functionalization of graphene, electrochemical conversion and storage of energy, nanocarbon based molecular architectures for light energy conversion, electrochemistry of fullerenes as applicable for functional devices, fullerenes as self-assembled morphological materials, semiconductor carbon nanotube optics, near-field optics of nanotubes and energy transfer at the nanoscale level, understanding the role of metal catalysts in chiral selective growth of carbon nanotubes, and finally, computational studies on the stability of fullerenes and metallofullerenes.

The current two volume set (Volumes 5 and 6) is dedicated in large part to recent discoveries on graphene. There are nine chapters in this set; the first four chapters (Volume 5) summarize the basic science of graphene. Specific topics include fundamental properties of graphene, adsorption and reactivity of graphene, chemical manipulation of graphene in dispersions, and thermodynamic characterization of thermal desorption of hydrogen from hydrogenated graphene layers. The next five chapters (Volume 6) provide an up-to-date summary of energy and sensor applications of graphene. The topics covered in this volume include graphene materials for energy conversion and storage applications, graphene for biosensor and electrochemical biosensor applications, and finally, carbon nanomaterials in biomedical and energy research.

Like the previous four volumes, the current two-volume set of the Handbook has been written as a hands-on reference guide for scientists working in the fields of biology, medicine, chemistry, physics, materials science, solid-state physics and nanotechnology. The coverage of topics presented is both in-depth and comprehensive. When combined with the perspectives for future research given by the contributing authors, this series makes an invaluable reference source that should be considered essential reading for both students and advanced researchers in the field.

The editors would like to acknowledge the contributors for their timely submission of the state-of-the-art reviews. Last, but not least, the staff of World Scientific Publishing Co. is acknowledged for their immense help in bringing out this publication in a timely manner.

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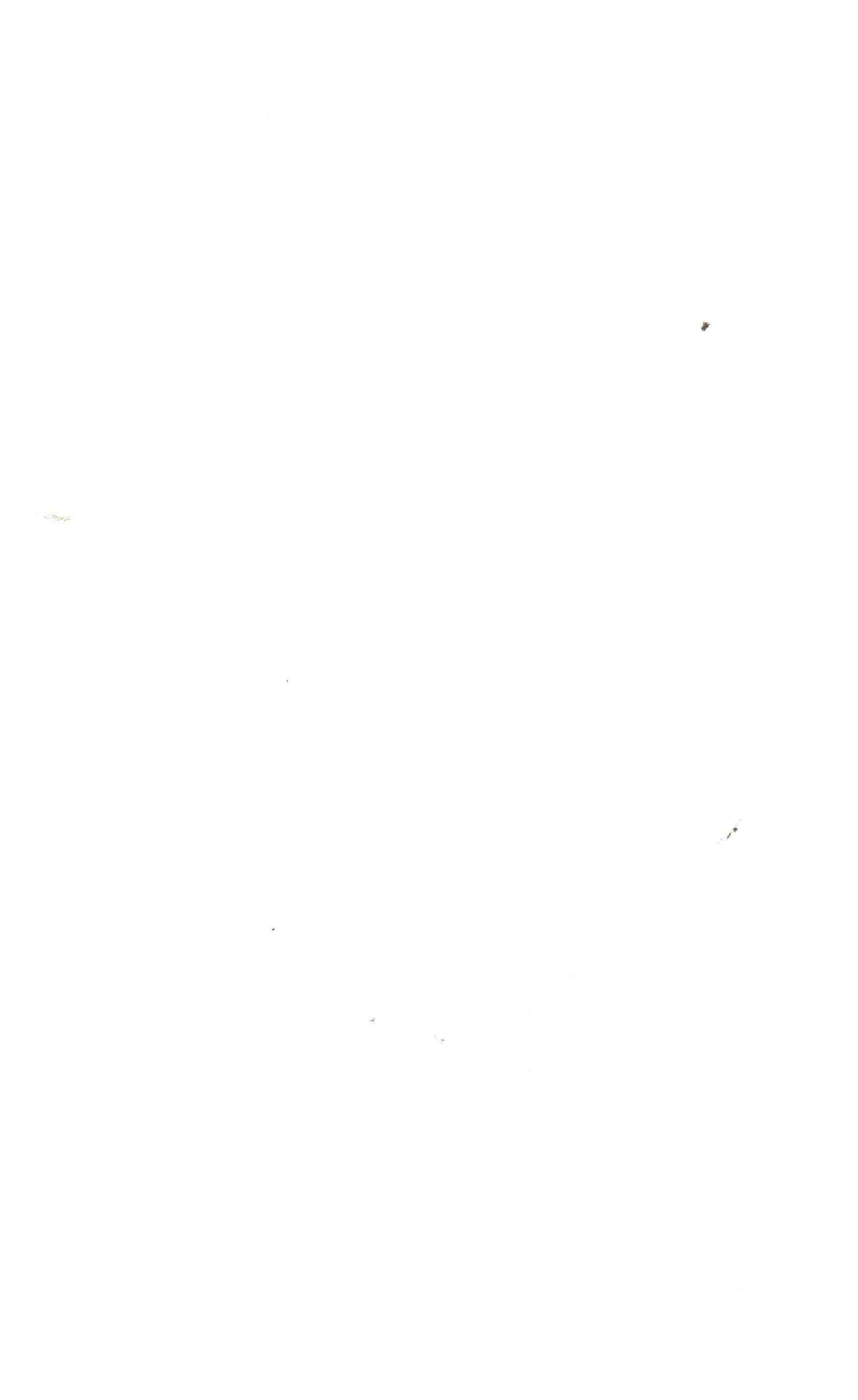
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