HANDBOOK OF CARBON NANO MATERIALS

Volume 3
Medicinal and Bio-related Applications

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Volume 4
Materials and Fundamental Applications

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World Scientific Series on Carbon Nanoscience

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Volume 3
Medicinal and Bio-related Applications

Editors

Francis D'Souza

University of North Texas, USA

Karl M. Kadish

University of Houston, USA

World Scientific

NEW JERSEY • LONDON • SINGAPORE • BEIJING • SHANGHAI • HONG KONG • TAIPEI • CHENNAI

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Preface

We are pleased to present the second two-volume set of *The Handbook of Carbon Nanomaterials*. The first two-volume set was published in recognition of the 25th anniversary of the discovery of Fullerenes, which was followed in later years by the discovery of carbon nanotubes and then graphene. These nanomaterials have taken a solid place in modern science and technology, as demonstrated by the awarding of two Nobel Prizes — the first, in Chemistry, was given in 1996 to Robert F. Curl Jr., Sir Harold Kroto and Richard E. Smalley for the discovery of fullerenes. The second, in Physics, was awarded in 2010 to Andre Geim and Konstantin Novoselov for the isolation of graphene. Since 1985, more than 110,000 scientific papers have been published on topics devoted to fullerenes, carbon nanotubes and related materials and there is no doubt that these types of carbon nanomaterials, with their unique structures and properties, will continue to find many new applications in all areas of science, medicine and technology.

The current *Handbook of Carbon Nanomaterials* consists of 17 chapters in two volumes; the first volume compiles chapters from leading authors on medicinal and bio-related applications while the second volume covers topics ranging from materials to fundamental applications. Specific topics covered in Volume 3 include 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 fullerenes. The specific topics covered in Volume 4 are 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.

Like the previous two volumes, the two-volume set of the present Handbook has been written as a hands-on reference guide for scientists working in the fields of biology and 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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