

Contents

1 Structures and Properties of Carbon Nanomaterials	1
1.1 Carbon Nanotubes	2
1.1.1 Atomic Structure and Morphology of Carbon Nanotubes	2
1.1.2 Synthesis and Processing of Carbon Nanotubes	4
1.2 Graphene Nanosheets	5
1.2.1 Properties of Graphene Nanosheets	6
1.2.2 Synthesis of Graphene Nanosheets	7
1.3 Graphene Nanoribbons	9
1.3.1 Properties of Graphene Nanoribbons	10
1.3.2 Synthesis of Graphene Nanoribbons	11
References	17
2 Strategies for the Hybridization of CNTs with Graphene	21
2.1 Assembly Method	22
2.1.1 Solution Processing	23
2.1.2 Layer-by-Layer Assembly	29
2.1.3 Vacuum Filtration	30
2.2 In Situ Method	34
2.2.1 Chemical Vapor Deposition	34
2.2.2 Unzipping	45
References	48
3 Graphene-CNT Hybrids for Energy Applications	53
3.1 Optoelectronic Devices	53
3.1.1 Organic Photovoltaics	53
3.1.2 Dye-Sensitized Solar Cells	57
3.2 Supercapacitors	64
3.3 Lithium Batteries	76
3.3.1 Lithium Ion Batteries	77
3.3.2 Lithium–Sulfur Batteries	80
References	84

4	Graphene-CNT Hybrids for Environmental Applications	91
4.1	Detection and Removal of Heavy Metal Ions	91
4.2	Removal of Organic Species.	94
4.3	Desalination	98
	References.	100
5	Summary and Perspectives.	103

Graphene-Carbon Nanotube Hybrids for Energy and
Environmental Applications

Fan, W.; Zhang, L.; Liu, T.

2017, X, 104 p. 43 illus., 38 illus. in color., Softcover

ISBN: 978-981-10-2802-1