
Contents

Chapter 1

Introduction to Nanoengineering.....	1
<i>John F. Maguire and David B. Mast</i>	

PART 1 Synthesis of Nanoscale Materials

Chapter 2

Design of Nanostructured Materials	
<i>Debasish Banerjee, Jingyu Lao, and Zhifeng Ren</i>	

Chapter 3

Carbon Nanotubes and Bismuth Nanowires	57
<i>Mildred S. Dresselhaus, Ado Jorio, and Oded Rabin</i>	

Chapter 4

Nanobelts and Nanowires of Functional Oxides	99
<i>Xudong Wang and Zhong Lin Wang</i>	

Chapter 5

Advances in Chemical Vapor Deposition of Carbon Nanotubes	125
<i>Vesselin N. Shanov, Atul Miskin, Sachin Jain, Peng He, and Mark J. Schulz</i>	

Chapter 6

Self-Assembled Au Nanodots in a ZnO Matrix: A Novel Way to Enhance Electrical and Optical Characteristics of ZnO Films.....	159
<i>Ashutosh Tiwari and Jagdish Narayan</i>	

Chapter 7

Synthesis of Boron Nitride Nanotubes Using a Ball-Milling and Annealing Method	169
<i>Ying Chen and Jim S. Williams</i>	

PART 2 Manufacturing Using Nanoscale Materials

Chapter 8

Plasma Deposition of Ultra-Thin Functional Films on Nanoscale Materials	100
<i>Peng He and Donglu Shi</i>	

Chapter 9

Structural Nanocomposites	225
<i>Hassan Mahfuz</i>	

Chapter 10

Synthesis and Characterization of Metal-Ceramic Thin-Film Nanocomposites with Improved Mechanical Properties	247
<i>Dhanjay Kumar, Jagannathan Sankar, and Jagdish Narayan</i>	

Chapter 11

Macroscopic Fibers of Single-Walled Carbon Nanotubes	263
<i>Virginia A. Davis and Matteo Pasquali</i>	

Chapter 12

Carbon Nanofiber and Carbon Nanotube/Polymer Composite Fibers and Films	285
<i>Han Gi Chae, Tetsuya Uchida, and Satish Kumar</i>	

Chapter 13

Surface Patterning Using Self-Assembled Monolayers: A Bottom-Up Approach to the Fabrication of Microdevices	
<i>Lakshmi Supriva and Richard O. Claus</i>	

Chapter 14

Enhancement of the Mechanical Strength of Polymer-Based Composites Using Carbon Nanotubes	
<i>Kin-Tak Lau, Jagannathan Sankar, and David Hui</i>	

Chapter 15

Nanoscale Intelligent Materials and Structures	347
<i>Yun Yeo-Heung, Inpil Kang, Sachin Jain, Atul Miskin, Suhasini Narasimhadevara, Goutham Kirkeria, Vishal Shinde, Sri Laxmi Pammi, Saurabh Datta, Peng He, Douglas Hurd, Mark J. Schulz, Vesselin N. Shanov, Donglu Shi, F. James Boerio, and Mannur J. Sundaresan</i>	

Chapter 16

Thermal Properties and Microstructures of Polymer Nanostructured Materials 409
Joseph H. Koo and Louis A. Pilato

Chapter 17

Manufacturing, Mechanical Characterization, and Modeling of a Pultruded Thermoplastic Nanocomposite
Samit Roy, Kalivarathan Vengadassalam, Farzana Hussain, and Hongbing Lu

PART 3 Modeling of Nanoscale and Nanostructured Materials

Chapter 18

Nanomechanics469
Young W. Kwon

Chapter 19

Continuum and Atomistic Modeling of Thin Films Subjected to Nanoindentation501
J. David Schall, Donald W. Brenner, Ajit D. Kelkar, and Rahul Gupta

Chapter 20

Synthesis, Optimization, and Characterization of AlN/TiN Thin Film Heterostructures
Cindy K. Waters, Sergey Yarmolenko, Jagannathan Sankar, Sudhir Neralla, and Ajit D. Kelkar

Chapter 21

Polarization in Nanotubes and Nanotubular Structures585
Marco Buongiorno Nardelli, Serge M. Nakhmanson, and Vincent Meunier

Chapter 22

Multiscale Modeling of Stress Localization and Fracture in Nanocrystalline Metallic Materials611
Vesselin Yamakov, Dawn R. Phillips, Erik Saether, and Edward H. Glaessen

Chapter 23

Modeling of Carbon Nanotube/Polymer Composites627
Gregory M. Odegard

Chapter 24

**Introduction to Nanoscale, Microscale, and Macroscale Heat Transport:
Characterization and Bridging of Space and Time Scales**

Christianne V.D.R. Anderson and Kumar K. Tamma

Index