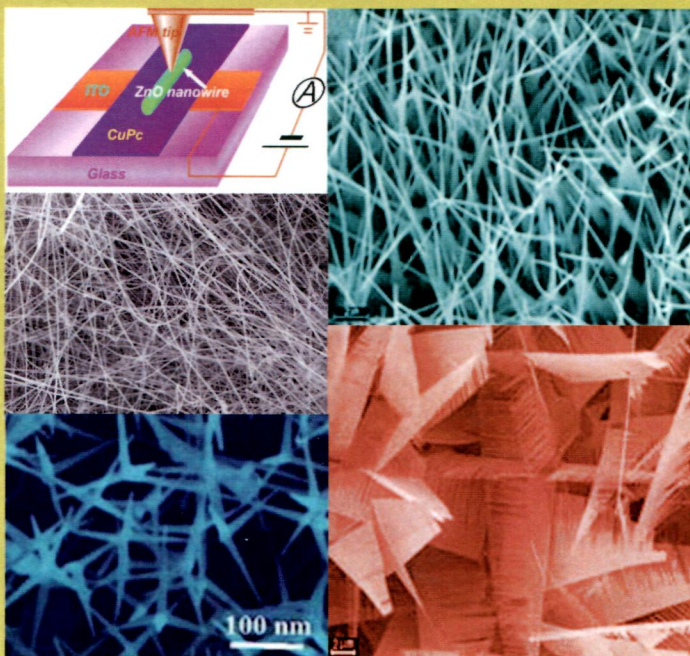


# Controllable Synthesis, Structure and Property Modulation and Device Application of One-Dimensional Nanomaterials



Editor-in-chief  
**Yue Zhang**

Editors  
**Yousong Gu • Yunhua Huang • Xiaoqin Yan • Qingliang Liao**

# **Controllable Synthesis, Structure and Property Modulation and Device Application of One-Dimensional Nanomaterials**

Proceedings of the 4th International Conference on  
One-Dimensional Nanomaterials (ICON2011)

Beijing, China,

7–9 December, 2011

Editor-in-chief

**Yue Zhang**

University of Science and Technology Beijing, China

Editors

**Yousong Gu**

**Yunhua Huang**

**Xiaoqin Yan**

**Qingliang Liao**

University of Science and Technology Beijing, China

 **World Scientific**

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

*Published by*

World Scientific Publishing Co. Pte. Ltd.

5 Toh Tuck Link, Singapore 596224

*USA office:* 27 Warren Street, Suite 401-402, Hackensack, NJ 07601

*UK office:* 57 Shelton Street, Covent Garden, London WC2H 9HE

**British Library Cataloguing-in-Publication Data**

A catalogue record for this book is available from the British Library.

**CONTROLLABLE SYNTHESIS, STRUCTURE AND PROPERTY MODULATION  
AND DEVICE APPLICATION OF ONE-DIMENSIONAL NANOMATERIALS  
Proceedings of the 4th International Conference on One-Dimensional Nanomaterials  
(ICON2011)**

Copyright © 2012 by World Scientific Publishing Co. Pte. Ltd.

*All rights reserved. This book, or parts thereof, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system now known or to be invented, without written permission from the Publisher.*

For photocopying of material in this volume, please pay a copying fee through the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. In this case permission to photocopy is not required from the publisher.

ISBN-13 978-981-4407-59-5

ISBN-10 981-4407-59-3

Printed and bound in Great Britain by  
Marston Book Services Limited, Oxfordshire

## Contents

Preface	v
Conference Committee	vii
Graphene and Graphene-Based Nanocomposites: Synthesis and Supercapacitor Applications <i>G. K. Wang, C. S. Liu, X. Sun, F. Y. Lu, H. T. Sun and J. Lian</i>	1
Progress in the Hydrothermal Formation of Dispersive Nano-Particles and Whiskers <i>L. Xiang</i>	10
The Growth of Al-Doped ZnO Nanoplate Arrays Influenced by Solution Concentration <i>L. D. Tang and B. Wang</i>	19
Influences of Hydrothermal Conditions on Morphologies of ZnO Nanowire Arrays <i>Z. Qin, Y. H. Huang, Q. Y. Wang and G. J. Zhang</i>	24
Microstructure and Growth Mechanism of Mn Doped ZnS Nanobelts <i>J. J. Qi, Q. Zhang, Z. Q. Deng and Y. Zhang</i>	30
Shape-Dependent Surface Plasmon Resonance of Ag Nanocrystallines in OPAA Template <i>S. S. Han and X. C. Yang</i>	38
Electrical Properties and Electric-Induced Nanodamage of Single Crystalline Bead-Shaped ZnO Nanorod <i>H. F. Li, P. F. Li and Y. H. Huang</i>	46
Optical Properties and Photocatalytic Activity of Mn-Doped ZnO Nanorods <i>J. Zhao, Z. M. Bai, X. Q. Yan and L. Wang</i>	54

Structure and Magnetic Property of Ni-Doped ZnO Nanorods <i>X. H. Zhang, X. Q. Yan, Q. L. Liao and J. Zhao</i>	62
Doping Effect of the Electronic Transport Properties of Zinc Oxides Nanowires Studied by First Principles Calculation <i>Y. S. Gu, X. Sun, X. Q. Wang and Y. Zhang</i>	68
Elastic Response of Copper Slabs to Biaxial Strain Studied by Density Functional Theory Calculation <i>X. Q. Wang, Y. S. Gu and X. Su</i>	76
Electronic Transport Properties of One Dimensional ZnO Nanowires Studied Using Maximally-Localized Wannier Functions <i>X. Sun, Y. S. Gu and X. Q. Wang</i>	84
Site Dependent Transport Properties of N-Doped Graphene Nanoribbons with Zigzag Edges <i>Y. Hu, Y. S. Gu, X. Sun and X. Q. Wang</i>	91
Length Effect on the Electronic Transport Properties of Mg/ZnO NW/Mg Nanostructures Studied by First Principles Calculation <i>Y. S. Gu, R. Gao, X. Sun and X. Q. Wang</i>	99
Ordered ZnO Nanorod Arrays for Ultraviolet Detection <i>F. Yi, Y. H. Huang and Y. S. Gu</i>	107
Effect of Localized UV Irradiation on Transport Property in ZnO Nanotetrapod Devices <i>W. H. Wang, J. J. Qi, Q. Y. Wang, Z. Qin, Z. Z. Wang, X. Sun and F. Yi</i>	117
ZnO Nanowires Based MSM Ultraviolet Photodetectors with Pt Contact Electrodes <i>H. S. Liu, X. Q. Yan, S. W. Ma and Z. M. Bai</i>	123
Solution Processed ZnO Nanorod Arrays/PFO Hybrid Heterojunction for Light Emitting <i>H. S. Liu, X. Q. Yan, X. Chen and Y. S. Gu</i>	129

Fabrication and Performance Study on Individual ZnO Nanowires Based Bioelectrode	136
<i>Y. G. Zhao and X. Q. Yan</i>	
Enzyme-Based Lactic Acid Detection Using AlGaAs/GaAs High Electron Mobility Transistor with Sb-Doped ZnO Nanowires Grown on the Gate Region	144
<i>S. W. Ma, Y. H. Huang, H. S. Liu, X. H. Zhang and Q. L. Liao</i>	
Single ZnO Nanowire-Based BioFET Sensors for Ultrasensitive, Label-Free and Real-Time Detection of Uric Acid	152
<i>P. Lin, X. Liu, X. Q. Yan, Z. Kang, Y. Lei and Y. G. Zhao</i>	
A High-Performance Glucose Biosensor Based on ZnO Nanorod Arrays Modified with Au Nanoparticles	162
<i>G. Zhang, Y. Lei and X. Q. Yan</i>	
Piezotronic Vibration Detector Based on ZnO Nanowire Arrays	174
<i>Z. Zhang, Y. H. Huang, Q. L. Liao, P. Li and S. P. Chen</i>	
Fabrication and Properties of a Microstrain Sensor Based on Zinc Oxide Network Structure	181
<i>P. Li, Q. L. Liao, Z. Zhang, S. W. Ma and Y. Zhang</i>	
Strain Sensors Based on Single High-Quality ZnO Microwires	188
<i>Z. W. Liu, X. Q. Yan and Y. Zhang</i>	
A Design of Rainbow Solar Cell: An Orderly Gradient of CdS-CdSe Sensitized ZnO Solar Cell	196
<i>X. Y. Hu and Y. W. Tang</i>	
Fabrication of Good Quality N (a-Si) - (na-Si)-P (mc-Si) Tunnel Junction for Tandem Solar Cells	204
<i>M. J. Shi, Y. Zhang and L. L. Chen</i>	
Preparation of Ga-Doped ZnO Nanorod Arrays for Dye Sensitized Solar Cells Applications	212
<i>Y. Qiu, Z. Qin and Y. S. Gu</i>	

Controlled Synthesis of ZnO Nanotetrapods and Performance OF ZnO Nanotetrapods Based Dye-Sensitized Solar Cells	219
<i>Q. Pang, Y. J. Feng, C. J. Liang And J. He</i>	
Electromagnetic and Microwave Absorption Properties of Carbonyl Iron/Tetrapod-Shaped ZnO Nanostructures Composite Coatings	228
<i>H. B. Yu, H. Qin and Y. H. Huang</i>	
Effect of Corrosion by Diluted HCl Solution on the ZnO: Al Texture	235
<i>M. J. Shi, P. Wang and L. L. Chen</i>	
Nanodamage and Nanofailure of 1D ZnO Nanomaterials and Nanodevices	242
<i>P. F. Li, Y. Yang, Y. H. Huang and Y. Zhang</i>	
Author Index	249