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Editors: Heike Riel, Margit Zacharias, Michael McAlpine, Theresa Mayer, Woo Lee, Hongjin Fan, Mato Knez and Stanislaus S. Wong

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**MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 1258**

**Low-Dimensional Functional
Nanostructures—Fabrication,
Characterization and Applications**

Symposium held April 5–9, 2010, San Francisco, California

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PREFACE

This volume contains papers presented at Symposium P, “Semiconductor Nanowires—Growth, Physics, Devices, and Applications,” Symposium Q, “Template-Based Nanofabrication—Nanowires, Nanotubes, and Associated Heteronanostructures,” and Symposium R, “Carbon Nanotubes and Related Low-Dimensional Materials,” held April 5–9 at the 2010 MRS Spring Meeting in San Francisco, California.

A fundamental challenge in nanotechnology is the deliberate and reliable manipulation of low-dimensional materials into functional nanostructures for practical applications. Thanks to the broad spectrum of scientific areas covered by the symposia, it was possible to bring together researchers from physics, chemistry, biology, and materials science with the aim of advancing the engineering of low-dimensional nanomaterials. The most recent results and breakthroughs were presented on design and synthesis of low-dimensional structures, structure-property relations at nanometer length scales, as well as functionalization & processing for device applications. The symposia generated high interest with more than 460 abstracts submitted for consideration. 37 prominent scientists of the related fields were invited to present their most recent results, and more than 203 oral presentations and 200 poster presentations were given during the five days of the meeting.

The contributions were directed towards the goal of exploring new functionalities of low-dimensional nanomaterials and developing innovative approaches to materials processing for applications. New directions for materials design and nanostructured devices were identified. Excellent presentations and vital discussions provided the basis to better understand and explore processing techniques and material properties with the promise to put them into real-life applications, including new generations of post-CMOS devices, data storage devices, light-emitting diodes, molecular electronic devices, energy harvesting devices, bio/chemical sensors, displays, and drug-delivery devices.

The areas of particular interest included:

- Controlled growth of Si, Ge, III-V and II-VI nanowire and nanotube arrays
- Template-based methodologies for low-dimensional nanostructures: atomic layer deposition, electro deposition, liquid-phase deposition
- Inorganic and organic templates for nanowires and nanotubes: anodic aluminum oxide, block co-polymer, virus, DNA, etc.
- Structure-property relations of low-dimensional nanostructures: morphological, structural, electrical, optical, and magnetic properties
- Innovative device-design and fabrication: modeling and characterization of nanowire/tube-based devices for optoelectronic, energy harvesting, and data storage applications

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- Unconventional approaches to patterning and novel nanotemplate: anodization, laser interference lithography, soft-lithography, dip-pen nanolithography, and etc.
- Carbon nanotubes and related low-dimensional carbon nanostructures
- State-of-the-art fabrication and integration methods for low-dimensional carbons and their emerging applications

We wish to thank all of the invited speakers for their outstanding presentations. Furthermore, we thank all of the contributors and participants who made these three symposia successful. We gratefully acknowledge the financial support provided by Air Force Office of Scientific Research (AFOSR), Beneq Oy, Cambridge Nanotech Inc., FEI Company, IBM Research, Institute of Advanced Studies (NTU), J. A. Wollam Co. Inc., Kurt J. Leskar Co., Oxford Instruments, Raith, Vistec, and the Materials Research Society.

Heike Riel
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