Unconventional Approaches to Nanostructures with Applications in Electronics, Photonics, Information Storage and Sensing

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Unconventional Approaches to Nanostructures with Applications in Electronics, Photonics, Information Storage and Sensing

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EDITORS:

Orlin D. Velev
North Carolina State University
Raleigh, North Carolina, U.S.A.

Timothy J. Bunning
Air Force Research Laboratory
Wright Patterson Air Force Base, Ohio, U.S.A.

Younan Xia
University of Washington
Seattle, Washington, U.S.A.

Peidong Yang
University of California-Berkeley
Berkeley, California, U.S.A.

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PREFACE

Nanostructures (or structures with at least one dimension between 1 and 100 nm) have attracted steadily growing interest due to their peculiar, fascinating properties and unique applications relative to the bulk materials. Many interesting new phenomena are associated with nanometer-sized dimensions; well-established examples include quantized excitation or emission, Coulomb blockade, single electron tunneling, metal-insulator transition, and superparamagnetism. By using these nanostructures as functional components, various prototypes of devices have been successfully fabricated recently, with notable examples including quantum dot lasers and single electron transistors.

The ability to generate these small structures is central to the advance of many areas in modern science and technology (e.g., electronics, photonics, and information storage). Although some nanostructures can be generated using advanced nanolithographic techniques (e.g., e-beam writing), the development of these methods into practical routes to large numbers of nanostructures rapidly and at low cost still requires great ingenuity. Chemical methods and self-assembly seem to provide a more promising strategy for the formation of nanostructures in terms of cost, throughput, and potential for large-scale production. The papers presented at Symposium Q, "Unconventional Approaches to Nanostructures with Applications in Electronics, Photonics, Information Storage and Sensing," held April 21-25 at the 2002 MRS Spring Meeting in San Francisco, California, and included in this proceedings volume, cover research ranging from the fundamental chemistry and physics of nanostructures, to their interactions with light and electricity, and to application in novel devices and technologies.

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Orlin D. Velev
Timothy J. Bunning
Younan Xia
Peidong Yang

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