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Editors: Carlos J. Martinez, Amit Goyal, Alberto Saiani, David Gracias and Rajesh R. Naik
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From Self-Assembly to Device Integration**

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PREFACE

This volume contains papers presented at five symposia: Symposium KK, “Micro- and Nanofluidic Systems for Material Synthesis, Device Assembly, and Bioanalysis”; Symposium LL, “Directed Assembly and Self Assembly—From Synthesis to Device Applications”; Symposium NN, “Materials Exploiting Peptide and Protein Self Assembly—Toward Design Rules”; Symposium OO, “Hierarchical Self Assembly of Functional Materials—From Nanoscopic to Mesoscopic Length Scales”; and Symposium PP, “Interfacing Biomolecules and Functional (Nano) Materials.” They were all held April 5–9 at the 2010 MRS Spring Meeting in San Francisco, California.

The integration of miniaturized components is essential to enable new functional capabilities for materials and devices. This integration can be achieved using conventional planar lithographic methods; however, cost-effective integration at nanometer size scales and in three dimensions remains challenging. Hence, there is a need to develop novel methods such as self-assembly, which is rapidly emerging as a new methodology to synthesize ordered structures from micro- and nanoscale building blocks.

The papers in this book are divided by the symposia at which they were presented, but have been collated in a single volume due to the numerous similarities and an overall theme of assembly and integration. The authors address the challenges in the cost-effective fabrication of miniaturized devices especially at small nano-sized scales and in three dimensions. These papers span a wide range of assembly methods including: molecular assembly methods with polypeptides and polynucleotides; rolling, wrinkling and self-folding of thin films; and self-assembly of lithographic structures using physical forces. Novel methods that seek to overcome challenges in enabling material and device designs for microfluidics and nanofluidics are included. Another area covered is that of biointerfaces and biomimetic materials with a focus on heterogeneous integration of materials from disparate material classes such as polymers, gels, and metallic & oxide-based nanoparticles.

Together, this collection of papers represents a comprehensive sampling of the state of the art of self-assembly and includes novel methods of device integration in micro- and nanotechnology. These are emerging fields and seek to transform electronics, medicine, optics, and the environment by enabling precisely nano- and micro-structured materials and devices on a hierarchy of length scales.

Carlos Martinez
Amit Goyal
Alberto Saiani
David Gracias
Rajesh Naik

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