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Microelectromechanical Systems—Materials and Devices IV

Editors Frank W. DelRio, Maarten P. de Boer, Christoph Eberl and Evgeni Gusev

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**MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 1299**

Microelectromechanical Systems—Materials and Devices IV

Symposium held November 29–December 3, Boston, Massachusetts, U.S.A.

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PREFACE

Symposium S, “Microelectromechanical Systems—Materials and Devices IV,” held November 29–December 3 at the 2010 MRS Fall Meeting in Boston, Massachusetts, focused on micro- and nanoelectromechanical systems (MEMS/NEMS), technologies which were spawned from the fabrication and integration of small-scale mechanical, electrical, thermal, magnetic, fluidic, and optical sensors and actuators with micro-electronic components. MEMS and NEMS have enabled performance enhancements and manufacturing cost reductions in a number of applications, including optical displays, acceleration sensing, radio-frequency switching, drug delivery, chemical detection, and power generation and storage. Although originally based on silicon microelectronics, the reach of MEMS and NEMS has extended well beyond traditional engineering materials, and now includes nanomaterials (nanotubes, nanowires, nanoparticles), smart materials (piezoelectric and ferroelectric materials, shape memory alloys, pH-sensitive polymers), metamaterials, and biomaterials (ceramic, metallic, polymeric, composite-based implant materials). While these new materials provide more freedom with regards to the design space of MEMS and NEMS, they also introduce a number of new fabrication and characterization challenges not previously encountered with silicon-based technology.

The symposium was devoted to addressing these challenges by providing a common forum for materials researchers and device engineers to discuss the relationships between MEMS and NEMS materials and device design, fabrication, performance, and reliability. 32 papers from the symposium are included in this proceedings volume. Of these, nine deal with material development and optimization, seven are devoted to process integration, eight explore new micro- and nanosensors, and eight look to address various aspects of material and device reliability. Thus, the volume focuses on both newer materials in the development and integration stages and traditional materials in the device optimization and reliability stages. Furthermore, it is worthwhile to note the continued success of MEMS and NEMS in drug delivery (one paper), cell manipulation and analysis (one paper), and power generation and storage (one paper), as these topics are critical to the emerging areas of nanomedicine and renewable energy.

This volume represents the fourth installment in a series of proceedings by MRS on this topic; the first three volumes were published as volumes 1052, 1139, and 1222. The fifth symposium in this series is scheduled for the 2011 MRS Fall Meeting.

Frank W. DelRio
Maarten P. de Boer
Christoph Eberl
Evgeni Gusev

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