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Editors: Tingkai Li, Yoshihisa Fujisaki, J. M. Slaughter and Dimitris Tsoukalas

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Materials and Processes for Nonvolatile Memories II

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PREFACE

The Symposium, "Materials and Processes for Nonvolatile Memories II," held April 10–13 at the 2007 MRS Spring Meeting in San Francisco, California, was the second in a series of MRS symposia on nonvolatile memories. During this symposium, progress in the technical development of many kinds of nonvolatile memories was highlighted. Research results were presented for semiconducting and metallic nanocrystal memories, SONOS, MRAM, FeRAM, RRAM and chalcogenide materials, as well as polymer materials and more recent advances in molecular memories. A wide range of materials and devices for the emerging fields of polymer and molecular memories are discussed in the *Polymer and Molecular Nonvolatile Memory Devices* chapter. The *Flash Nonvolatile Memory Devices* chapter includes the state of the art in embedded flash memory and the challenges in achieving automotive-temperature operation. The *Nano-Particle Nonvolatile Memory Devices* chapter shows that nanoparticle-based approaches to flash memory face the challenge of obtaining large memory windows to compete with SONOS or other trap-based memories which are the industry choice at present. In that respect, metal nano-particles which allow for work function engineering, combined with a high-k material for reduced voltage operation, show good potential. The field of resistance switching materials is maturing rapidly as demonstrated by the excellent overview and summary of RRAM switching mechanisms in the *Resistance Switching Nonvolatile Memory Devices* chapter. The *Ferroelectric Nonvolatile Memory Devices* chapter focuses on advances in materials and device demonstrations for both capacitor-type and ferroelectric-gate memory and approaches to achieving high-density ferroelectric memories. The *Phase Change Nonvolatile Memory Devices* chapter describes a wide variety of materials that continue to be considered for phase-change and resistance switching memories, while understanding of the most established materials is quickly maturing. The *Magnetic Nonvolatile Memory Devices and Others* chapter includes three papers that deal with progress towards magnetic memory cells integrated at the silicon device level as well as optical memory devices.

The strong and increasing interest in nonvolatile memories, both domestic and international, indicates the worldwide importance of these materials and memory devices. This symposium proceedings volume represents the latest technical advancements and information on nonvolatile memory devices from universities, national laboratories and industry. It also provides insight into emerging trends in these exciting technologies.

Tingkai Li
Yoshihisa Fujisaki
J.M. Slaughter
Dimitris Tsoukalas

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