

**New Functional Materials
and Emerging Device Architectures
for Nonvolatile Memories**

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New Functional Materials and Emerging Device Architectures for Nonvolatile Memories

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EDITORS

Dirk J. Wouters

IMEC
Leuven, Belgium

Eisuke Tokumitsu

Tokyo Institute of Technology
Yokohama, Japan

Orlando Auciello

Argonne National Laboratory
Argonne, Illinois, U.S.A.

Panagiotis Dimitrakis

NCSR Demokritos
Aghia Paraskevi, Greece

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PREFACE

Symposium Q, “New Functional Materials and Emerging Device Architectures for Nonvolatile Memories” held April 25–29 at the 2011 MRS Spring Meeting in San Francisco, California, was a follow up of a previous series of related Symposia on Non-Volatile Memories at MRS Annual Meetings, including the following: 1) Symposium “**Materials and Physics for Non-Volatile Memories**” organized for the first time in 2004 during the Fall MRS Meeting in Boston; 2) Symposium “**Materials and Processes for Non-Volatile Memories**” held in the 2007 MRS Spring Meeting; 3) the Symposium series titled “**Materials Science and Technology of Non-Volatile Memories**” held at the 2006 and 2008 MRS Spring Meetings; 4) the Symposia entitled “**Materials and Physics for Non-Volatile Memories**” held in the 2009 and 2010 MRS Spring Meetings.

The high attendance and large paper submission (in total 67 oral and 34 poster contributions were presented in 10 sessions, in addition to 9 invited talks), indicate the continuing strong international interest and research effort in the field of emerging new non-volatile memory materials. The Session on Phase Change Memories was shared with the Symposium Phase-Change Materials for Memory and Reconfigurable Electronics Applications. We are also proud that two of the presented posters of this Symposium have won the *MRS Poster Award*.

Main areas of research featured in Symposium Q were Advanced Flash Memories, Phase Change Memories, and—in particular—Resistive Switching Memories. In addition, Ferroelectric Memories, Organic Memories, and New Emerging Memories remained of interest.

The selected papers in this Proceedings volume have been categorized in three Chapters. The Chapter *Advanced Flash and Nano-Floating Gate Memories* deals with solutions for scaled Flash memory, including the use of new high- κ layers and nanocrystals. *Resistive Switching Memories* are discussed in the second Chapter. The final Chapter includes Phase Change and Ferroelectric Memories, as well as contributions on Organic Memories.

A highly successful one-day tutorial was conducted, including tutorials on Memory Devices for Organic Electronics, Ferroelectric Memories, Redox-based Resistive Switching, and Materials and Concepts for Magnetic Memory.

With international contributions from university, research centers and industry, the papers from this Symposium Proceedings reflect the recent advances in material science and their influence in the memory technologies addressed in this Symposium.

Dirk J. Wouters
Eisuke Tokumitsu
Orlando Auciello
Panagiotis Dimitrakis
Yoshihisa Fujisaki

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Tutorial Speakers:

- Michael C. Petty (Durham University, United Kingdom), Daisaburo Takahsima (Toshiba Corporation, Japan), Rainer Waser (RWTH Aachen University, Germany), Samuel D. Bader (Argonne National Laboratory)

Invited Speakers:

- Kirk Prall (Micron Technology), Ted Moise (Texas Instruments), S. Sakai (National Institute of Advanced Industrial Science and Technology, Japan), Seungbum Hong (Argonne National Laboratory), Andrea Redaelli (Numonyx), Hongsik Jeon (Samsung Electronics), Ramamoorthy Ramesh (University of California, Berkeley), Tsu-Jae King Liu (University of California, Berkeley), Carlos Paz de Araujo (University of Colorado at Colorado Springs and Symetrix Corporation)

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