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Edited by S. Ashok, J. Chevallier, P. Kiesel and T. Ogino

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Materials, Synthetic Structures
and Devices II**

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**MATERIALS RESEARCH SOCIETY
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Semiconductor Defect Engineering— Materials, Synthetic Structures and Devices II

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PREFACE

This volume contains papers submitted to Symposium F, "Semiconductor Defect Engineering—Materials, Synthetic Structures and Devices II," held April 9–13 at the 2007 MRS Spring Meeting in San Francisco, California. It follows on highly successful earlier symposia held approximately triannually since the inaugural symposium in 1992. The intent of this gathering has been to explore deliberate introduction and manipulation of defects and impurities in order to engineer some desired properties in semiconductor materials and devices. Reflecting on the maturing of the theme, the response from the research community has again been very positive, with about 150 abstracts submitted from around the world.

The organization of this proceedings volume closely follows the topics around which the sessions were built. The papers are grouped around distinct topics covering materials, processing and devices. The papers on grown-in defects in bulk crystals deal with overviews of intrinsic and impurity-related defects, their influence on electrical, optical and mechanical properties, as well as the use of impurities to arrest certain types of defects during growth and defects to control growth. In the case of epitaxial films, additional issues concerning stoichiometry and defects caused by plasmas and electron/ion irradiation are included. In view of the current exciting developments in widegap semiconductors like GaN, ZnO and SiC for blue light emitting devices and high-temperature electronics, a number of the papers dealt with dopant and defect issues relevant to these materials.

Defect reaction problems pertaining to impurity gettering, precipitation and hydrogen passivation are indeed specific examples of defect engineering that improve the electronic quality of the material. An interesting recent example in this area is hydrogen passivation of nitrogen in dilute III-V alloys. A number of invited and contributed papers also dealt with sophisticated new characterization techniques needed to study, identify and image these defects—even at the individual level—in materials and device structures. Defect issues in the emergent nanostructures and organic semiconductors were also addressed.

The scope of defect and impurity engineering is far-ranging as exemplified by phase and morphological stability of silicides, interface control and passivation, and application of ion implantation, plasma treatment and rapid thermal processing for creating/activating/suppressing trap levels. A good complement of papers in these areas is also found in this volume.

The symposium lasted the entire four days of the MRS Meeting, with eight oral sessions and two evening poster sessions. In addition, the symposium sponsored a half-day tutorial entitled "Magnetic Resonance in Materials Science," given by Patrick Lenahan of The Pennsylvania State University, University Park, Pennsylvania. There were in all 12 invited talks, 41 contributed oral presentations and 43 posters. All the papers in this volume were peer-reviewed and revised following the conference. We are most grateful to the referees for their steadfastness in attending to their task. The quality of the conference proceedings critically depends on this voluntary endeavor, in addition to the care exercised by the authors. Subject to the limitations of the electronic review process and the publication deadline, we have attempted to reduce errors, and for the inevitable shortcomings, we seek the forbearance of the readers.

A majority of the papers presented at the symposium are included in this volume.

S. Ashok
J. Chevallier
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