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Materials Research Society Symposium Proceedings: Volume 719

Editors: S. Ashok, J. Chevallier, N. M. Johnson, B. L. Soporì and H. Okushi

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Engineered Semiconductors
and Devices III**

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Defect and Impurity Engineered Semiconductors and Devices III

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PREFACE

This volume results from Symposium F, "Defect and Impurity Engineered Semiconductors and Devices III," held April 1-5 at the 2002 MRS Spring Meeting in San Francisco, California. The symposium follows on successful previous symposia at the 1995 and 1998 MRS Spring Meetings, and an earlier precursor entitled "Defect Engineering in Semiconductor Growth, Processing and Device Technology," held at the 1992 MRS Spring Meeting. It has continued to focus on the deliberate introduction and manipulation of defects and impurities in order to engineer some desired properties in semiconductor materials and devices. Reflecting a certain maturity of the theme reached over the past decade, the response from the academic and industrial research community has again been very positive, with over 100 abstracts submitted from around the world.

The organization of this proceedings volume closely follows that of the symposium sessions. The papers are grouped around distinct topics covering materials, processing and devices. In view of the current exciting developments in wide-bandgap semiconductors like GaN for blue light emission as well as high-speed and high-temperature electronics, the dopant and defect issues relevant to these materials were addressed in a particular session. Another special topic chosen this time was semiconductor nanocavities and nanostructures, with emphasis on the formation and impact of vacancy-type defects.

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. A good part of this symposium has been devoted to these issues. A number of invited and contributed papers also dealt with characterization techniques needed to study and to identify these defects in materials and device structures.

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

The symposium lasted the entire five days of the MRS Meeting, with twelve oral sessions, an evening poster session and a comprehensive full-day tutorial on "Semiconductor Defect Characterization by Deep Level Transient Spectroscopy Techniques," given by Y.N. Mohapatra of the Indian Institute of Technology, Kanpur, with an introductory lecture by N.M. Johnson of PARC. There were in all 16 invited talks, 48 contributed oral presentations and 35 posters. All the papers were peer-reviewed electronically after the conference and the majority of them revised. We are most grateful to the referees whose voluntary endeavor is critical to maintaining the quality of the conference proceedings. Within the limitations of what is possible in an all-electronic review process and publication deadline, efforts were made to reduce errors, but the reader is urged to bear with the inevitable shortcomings in the spirit of the symposium title!

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

S. Ashok
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