MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 490

Semiconductor Process and Device Performance Modelling

Symposium held December 2–3, 1997, Boston, Massachusetts, U.S.A.

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MRS
Materials Research Society
Warrendale, Pennsylvania
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PREFACE

The concept of a ‘virtual semiconductor fab’ requires a focused effort among engineering, physics, chemistry, materials, mathematical and computational sciences. Although widely used by the semiconductor industry, current technology computer-aided design (TCAD) struggles to keep pace with new generations of IC technology. The semiconductor industry needs improved, predictive physically-based modelling and simulation capabilities to decrease cost, improve efficiency, and provide TCAD tools to process developers before production begins. Without the use of more advanced ‘next generation’ TCAD models, future IC technology development will slow as a result of expensive and time-consuming experimental validation of processes and device performance.

This symposium brought together researchers from industry, universities, and national laboratories to highlight recent advances in TCAD, and to identify critical areas for future emphasis. Papers were solicited in both silicon and compound semiconductor process and device performance modelling. By bringing together silicon and compound semiconductor researchers, we hoped to facilitate cross-fertilization of ideas and modelling tool sets.

The main topics of the symposium were:

1. **Bulk Process Modelling**, including ion implantation, transient-enhanced diffusion, rapid thermal annealing, extended and point defects, dopant diffusion, and interfaces

2. **Equipment Modelling**, including fluid dynamics, heat transfer, chemical vapor deposition, thermal and plasma processing

3. **Topography Modelling**, including etch, deposition, interconnect reliability and grain structure evolution

4. **Characterization and Device Modelling**, including short-channel effects, quantitative mobility spectrum analysis, charge-coupled devices, and thermoelectrics

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August 1998