



Foreword

Microelectronic Engineering Special Issue: Characterization and mechanical reliability of advanced electronic materials at nanoscale

This special issue of Microelectronic Engineering contains selected papers presented at the Symposium on Characterization and Mechanical Reliability of Advanced Electronic Materials at Nanoscale, sponsored by the ASME MD Committee on Electronic Materials, part of the 2003 ASME Mechanics and Materials Conference held in Phoenix, AZ June 17–20, 2003.

Rapid advances in microelectronics and MEMS pose great materials and mechanical challenges. Here, materials are in the form of nanoscale structures with a significant volume comprised of interfaces, surfaces, and grain boundaries resulting in properties vastly different from their bulk counterparts. Phenomena observed in these structures include plasticity, mass transport, fracture and adhesion failures. The device materials have to withstand multiple temperature cycles, as well as mechanical stresses imposed during processing, packaging, and in operation. Phenomena like electro and stress migration become extremely important as the features get smaller.

Characterizing advanced materials in microelectronics and MEMS becomes extremely challenging, as one has to operate almost on the angstrom scale. Previously routine tasks such as film thickness measurement now require development of novel characterization techniques. The symposium has met the objective of bringing academia and industry together in solving these problems.

Symposium topics included:

- Structure–properties relationship at the nanoscale.

- Elasticity, plasticity, adhesion and fracture at nanoscale.
- Stress-induced effects in thin films.
- Electromigration and stress migration in metallic interconnects.
- Mechanical stability and reliability of low-K dielectrics.
- New methods of physical properties characterization at nanoscale.
- Tribological properties of nanostructured materials.
- Theoretical, computational and analytical modeling.

Finally, we would like to thank the contributors to this special issue for their enthusiasm in response to the call for papers, as well as the many referees for their timely reviews, which made this issue possible. The financial support for the Symposium from Motorola, Hysitron Inc. and Bede Scientific is also greatly appreciated.

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