Performance and Reliability of Semiconductor Devices

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Performance and Reliability of Semiconductor Devices

Symposium held November 30–December 3, 2008, Boston, Massachusetts, U.S.A.

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*Invited Paper

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PREFACE

Symposium A, "Performance and Reliability of Semiconductor Devices," was held November 30–December 3 at the 2008 MRS Fall Meeting in Boston, Massachusetts. Materials-based issues are a primary restriction in the reliability of semiconductor devices as well as the performance of next-generation optoelectronic and electronic devices. This symposium presented state-of-the-art results across several applications with a concentration on fundamental materials and device issues in performance and reliability.

The *Gallium Nitride Electronic Devices* chapter gives an overview of the state-of-the-art in high electron mobility transistor (HEMT) devices with several interesting works on circumventing the current performance limiters in this device structure. The *Nano-Engineered Devices* chapter provides a snapshot of the current understanding in modifying the nanoscale specific properties of quantum dot and quantum well devices. The *Performance of Semiconductor Devices* chapter surveys important research advancements in several fields including terahertz ellipsometry, high-power multi-emitter laser bars, and thin-film transistors. The *Advanced Materials and Devices* chapter highlights designs in ultrathin high-κ gate dielectrics for CMOS and related devices. This chapter also presents a report on the implementation of III-V materials as a replacement for the silicon channel in future CMOS technology.

Despite the rapid development in these semiconductor based devices, there still exist fundamental materials and physics issues that limit the expansion of these devices in their respective application space. This symposium proceedings represents the latest technical advancements and information on semiconductor materials and devices from universities, national laboratories and industries. It also provides insight into emerging trends in these exciting technologies.

Michael Mastro
Jeffrey LaRoche
Fan Ren
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