Introduction to the Special Issue on the 2007 International Integrated Reliability Workshop

THE PAPERS in this Special Issue were selected from the presentations at the 2007 IEEE International Integrated Reliability Workshop (IIRW). The workshop took place at the Stanford Sierra Camp on the shores of Fallen Leaf Lake, near South Lake Tahoe, California, on October 15–18, 2007. The IIRW is sponsored by the IEEE Reliability Society and Electron Devices Society.

The IIRW is not a typical technical meeting. The workshop is organized to maximize interactions between attendees. All attendees stay in cabins on the lakeshore, without televisions or telephones. Attendees all eat together in meals served family style at the camp lodge. Attendees are expected to actively participate and are drawn into technical discussions from the start. Days are filled with oral presentations and tutorial lectures. Evenings are spent in discussion groups, special interest groups, and poster sessions. The fresh mountain air apparently stimulates the discussions, which often continue far into the night. The workshop annually publishes a final report that represents all of the refereed presentations. This Special Issue contains seven significantly expanded final reports, which have undergone the full IEEE Transactions on Device and Materials Reliability (TDMR) review process. These seven papers provide a representative cross section of the work presented at the 2007 IIRW and include some of the finest work presented at last year's workshop.

One of the most important topics in reliability today is negative bias temperature instability (NBTI). NBTI was a major topic at the 2007 workshop, and our Special Issue features two excellent papers on the topic. T. Grasser *et al.* of the Technical University of Vienna, Vienna, Austria, collaborated with B. Kaczer of IMEC in a study of NBTI measurement techniques ("A Rigorous Study of Measurement Techniques for Negative Bias Temperature Instability"). S. Pae *et al.* of Intel, Hillsboro, OR, studied NBTI in advanced logic technologies ("Effect of NBTI Degradation on Transistor Variability in Advanced Technologies").

Another important reliability topic featured at the 2007 IIRW was gate-induced drain leakage (GIDL). X. Yuan *et al.* of IBM, Infineon, and Samsung characterized GIDL in some detail in "state-of-the-art" devices ("Characterization and Analysis of Gate Induced-Drain-Leakage Current in 4-S n-p-n CMOS technology").

A relatively "new" topic at the IIRW has been reliability issues in fuses. This Special Issue includes two interesting papers on fuse reliability. C. Tian *et al.* of IBM's Semiconductor Research and Development Center, East Fishkill, NY, explored reliability issues in NiPtSi/p poly-Si fuses ("Reliability Investigation of NiPtSi Electrical Fuse With Different Programming Mechanisms"). H. Suto *et al.* of Sony Corporation reported on a study of e-fuses with narrow links of Ni-silicided poly-Cu ("Programming Conditions for Silicided Poly-Si or Copper Electrically Programmable Fuses").

The workshop frequently features several presentations dealing with the underlying physical processes involved in various reliability problems. The 2007 workshop was no exception. W. Goes and T. Grasser of the Technical University of Vienna reported on a first-principle simulation study of MOS oxide-trapping defects ("Charging and Discharging of Oxide Defects in Reliability Issues"). Their addition to this Special Issue should contribute to our fundamental understanding of multiple reliability issues, particularly NBTI. Another area of interest in the workshop is reliability measurement. One of the most important reliability problems in MOS technology is the generation of semiconductor/dielectric interface traps. T. Aichinger and M. Nelhiebel of Kompetenzzentrum Automobil- und Industrie-Elektronik (http://www.k-ai.at/) reported on constant-base-level charge pumping. This charge pumping technique is not widely utilized, but, as the authors pointed out in their very nice paper, the technique offers more accuracy than the "classical" constant amplitude technique.

We feel certain that these papers represent a significant contribution to the "state of the art" and hope that they provide a representative cross section of the excellent work presented at the 2007 IEEE IIRW.

ACKNOWLEDGMENT

The guest editors would like to thank Editor-in-Chief T. Oates, and J. A. Marsh and M. San Giovanni of the TDMR staff for their support and patience in preparing this Special Issue.

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Digital Object Identifier 10.1109/TDMR.2008.2006011