NBTI

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Roughly 200 papers on NBTI have been presented at the major reliability conferences in the last decade. The yearly number is still rising. The number of proven facts about NBTI is in great disproportion to the number of publications. The tutorial will present a critical review of some contradicting findings and claims made regarding NBTI, and try to decide if / or not they are in agreement with hard experimental facts or at least backed up by some experimental evidence. Until recently ESR was the only technique allowing an investigation of the nature of microscopic defects in SiO2 and the interface. In the last two years also electrical defect spectroscopy measurements (TDDS), systematically probing the electrical properties of single oxide defects, have been started. The TDDS technique, which is based on the RTS measuring technique, and the results will be shown. The findings from the literature will be reviewed in the light of these recent TDDS insights. TDDS opens new perspectives on modeling degradation and recovery of NBTI which can be easily implemented into circuit simulators. AC-(N)BTI has a great importance for combinational logic. Thus a focus topic will be the understanding of the special features of AC-BTI, i.e. the duty cycle and frequency dependence and the recovery after AC-stress.

Hans Reisinger

received his diploma in physics (1979) and his Ph.D. (1982) both from the Technical University of Munich. In 1982/83 he was with the IBM T.J.Watson Research Ctr. in Yorktown Heights, NY. Topics of his research were electronic properties of 2d-space charge layers on Si and III-V semiconductors. In 1986 he joined the Siemens Semiconductor Department (now Infineon). His work was focused on the study of thin dielectrics and interfaces in DRAMs and NVMs, including film fabrication and optical and electrical characterization. Currently he is with the Infineon Central Reliability Methodology group and mainly works on the problems of threshold instabilities of MOSFETs with SiO2 and HiK dielectrics.