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Enhanced defect generation in gate oxides of p-channel MOS transistors in a moisture ambient ARITRA DASGUPTA, S.A. FRANCIS, D.M. FLEETWOOD, Department of Electrical Engineering and Computer Science, Vanderbilt University — Transistors and ICs built in Sandia's 4/3 μm technology were exposed to moisture, irradiated, and annealed. The moisture exposures were performed using highly accelerated stress test (HAST) at 130°C and 85% relative humidity. Irradiation of n-channel transistors exposed to HAST followed by a long-term anneal resulted in some increase in interface-trap and oxide-trapped charge buildup. We observed enhanced post-irradiation defect generation of oxide trapped charge, interface traps and border traps in the gate oxides of p-channel MOS transistors that were exposed to humidity. This is characterized by enhanced voltage shifts due to oxide trapped charge and interface traps observed in the p-channel transistors. Low frequency noise measurements also showed enhanced low frequency noise power in the moisture exposed p-channel transistors. Our results indicate that there are enhanced precursor hole trap defects or oxygen vacancies present in the gate oxide of p-channel transistors as a result of presence of moisture or hydrogenous ambient. The smaller voltage shifts in the n-channel transistors may be related to the presence of phosphorus atoms in the gate oxides.

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