Negative Bias Temperature Instability (NBTI): Physics, Materials, Process and Circuit Issues

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Abstract

In this talk I will present an overview of negative bias temperature instability (NBTI) commonly observed in p-channel MOSFETs when stressed with negative gate voltages at elevated temperatures. The talk will concentrate on the physics, materials, process, and some circuit issues, e.g., dc versus ac stress. I discuss the results of such stress on device performance and review interface traps and oxide charges, their origin, and present understanding of NBTI. Next I discuss the effects of varying parameters (hydrogen, nitrogen, water, fluorine, deuterium, boron, temperature, electric field, and gate length) on NBTI and conclude with NBTI and minimization.