Some Degradation Measurements and Models on Nano Reliability

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Reliability theory and failure mechanism of macro- and microworld are only partially applicable in the nanoworld. Still reliability theory is generic and will be applicable with proper modifications. Nondestructive evaluation techniques such as degradation measurements are very useful to assure quality of finished materials and products in nanoscale. In this talk we review some measurements and models describing the degradation of materials and devises in nanoscale from the statistical perspective: (a). In relating nanoscale events to the eventual deterioration in macroscopic properties, the changes in gloss and contact angle are considered to model the degradation of surface roughness in pigmented coatings; (b). The transconductance and threshold voltage are used for the measurements of degradation rates in a polysilicon TFT and the degradation rates are significantly affected by the film thickness; (c). The degradation measurements and models of leakage current reveal the breakdown dynamics of ultra-thin gate oxides in MOS.

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