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STM Observation Of Stress-Induced Leakage Current Sites In The Ultra Thin Oxide On Si Surface.

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We observed stress-induced leakage current sites of ultra thin (~ 1nm) oxide layer on Si wafers by Scanning tunneling microscope. Chemically oxidized and thermally grown (dry and wet) oxide layers were used for the experiments. Stressing was performed by scanning localized area with high gap-voltage and high current. For chemical oxide, samples were annealed at 550℃ in UHV chamber before the experiments. It presented the sharper contrast between the leakage sites and the rest of the stressed area. For thermally grown oxide layer, leakage sites distributed more or less uniformly over the stressed area. In contrast, for the chemical oxide layer, current leakage occurred at the very localized area. These results could explain the density of the trap generated by the high voltage and current stressing in the oxide layer and distribution of the traps according to the oxidation methods.