

Electrical and Structural Investigation of Bonded Silicon Interfaces

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Silicon wafers are bonded hydrophilic, hydrophobic and in the UHV. Initial bonding is performed at room temperature. The electrical properties are characterized by temperature dependent current-voltage and complex impedance measurements. The current flows thermally activated across the interface. The complex impedance measurements show filling and emptying of interface states. The overall behavior of the interface can be described with the trap transistor model. Annealing of the bonded interfaces usually decreases the barrier height. Typical barrier heights for UHV bonded NN or PP junctions are between 300 meV and 400 meV. TEM investigations of room temperature bonded UHV interfaces show no dislocation networks. We observe nano scale strain contrast at the interface. This can be attributed to distorted silicon bonds which are responsible for interfaces states.