ABSTRACT

Oxidation-induced stacking fault (OISF) dimension and density change on (100) and (111) wafers, as a result of repeated preferential etching were studied using AFM, optical microscope and angular polishing techniques. Density on (100) and (111) wafers is independent of surface removal up to 3.0μm. This indicates the single layer nature of OISF formed from the sand blasted wafer. Besides having higher density, OISFs from (100) wafer were longer than OISF from (111) wafer. OISF width increases linearly with surface removal however the length does not change significantly with surface removal. In the OISF normal depth studies using angular polishing technique, OISF depth on (100) wafer is double of those on (111) wafer, regardless of wafer sand blasting pressure. At lower blasting pressure, OISF density of (100) wafer is higher than (111) wafer because energy required to displace silicon atoms from (100) surface is much lower compared to (111) wafer's. When blasting pressure is increased to higher level, OISF density on (100) wafer saturates because all displaceable surface atoms had been displaced from their lattice. However for (111) wafer blasted at higher blasting pressure, displaceable surface atoms on (111) wafer are still available due to its higher surface packing density. Therefore when OISF density of (100) wafer saturates, OISF density of (111) wafer still presenting a linearly increasing trend until it overtakes (100)'s OISF density.