ABSTRACT

LOW DEFECT DENSITY, IDEAL OXYGEN PRECIPITATING SILICON

A single crystal silicon wafer which, during the heat treatment cycles of essentially any electronic device manufacturing process, will form an ideal, non-uniform depth distribution of oxygen precipitates. The wafer is characterized in that it has a non-uniform distribution of crystal lattice vacancies, the concentration of vacancies in the bulk layer being greater than the concentration of vacancies in the surface layer and the vacancies having a concentration profile in which the peak density of the vacancies is at or near a central plane with the concentration generally decreasing from the position of peak density in the direction of a front surface of the wafer. In one embodiment, the wafer is further characterized in that it has a first axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated intrinsic point defects, wherein the first axially symmetric region comprises a central axis or has a width of at least about 15 mm. In another embodiment, the wafer is further characterized in that it has an axially symmetric region which is substantially free of agglomerated intrinsic point defects, the axially symmetric region extending radially inwardly from a circumferential edge of the wafer and having a width, as measured from the circumferential edge radially toward a center axis, which is at least about 40% the length of a radius of the wafer.

FIG. 1