EFFECTS OF OXYGEN ANNEALING ON SILICON CARBIDE THIN FILMS

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Silicon carbide (SiC) is becoming an attractive semiconductor material for many high temperature applications because of its wide band gap, high thermal conductivity, high breakdown electric field, and high saturation velocity.

Amorphous silicon carbide films were deposited by r.f. sputtering technique using a SiC target. These films were annealed in dry oxygen ambient in the temperature range of 400-700 °C. Subsequently the films were characterized using XPS to investigate the chemical composition at each annealing temperature. Surface morphology of the oxidized films was characterized using Atomic Force Microscope (AFM).

The effect of oxidation on the optical properties of the SiC thin films was also investigated. For optical studies, amorphous SiC films were sputtered on to quartz substrates and subsequently annealed in oxygen ambient over the same temperature range. Optical absorption studies indicated an increase in bandgap for the films when subjected to annealing in oxygen ambient. The percentage of optical transmission also increased with increase in annealing temperature. The thickness of the grown oxide film showed a decreasing trend with increasing temperature, indicating that oxidation of the SiC films is a diffusion-limited process.