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Analysis of Iodine Implanted 6H-SiC

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Abstract content
   (Max 300 words)

SiC is a material used in two future energy production technologies: As a diffusion barrier material for radioactive waste in the next generation of nuclear power plants, and as a photovoltaic layer to harness the UV spectrum in high power solar cells. For both applications, there is interest in the implantation of reactive materials, such as iodine, into SiC and its effect on the properties of the SiC.

In this study 360 keV I+ ions were implanted into 6H-SiC at various substrate temperatures. The implanted samples were also annealed in vacuum at temperatures ranging from 900℃ to 1500℃ for various times. Radiation damage created by the implanted iodine ions and its subsequent annealing in vacuum were investigated by RBS-channeling and Raman spectroscopy. Room temperature implantation into 6H-SiC led to the formation of an amorphous layer which was difficult to anneal at temperatures used in this study. In contrast implantation of iodine at 350℃ and 600℃ did not cause amorphisation.

The surface topography and morphology of the implanted and annealed 6H-SiC were studied by AFM (Atomic Force Microscopy) and high resolution SEM (Scanning Electron Microscopy). After annealing at 900℃ there was evidence of recrystallization of the amorphous SiC layer into a polycrystalline film. At higher annealing temperatures the dendritic crystallites formed with a corresponding increase in the topography of the surface.

The implications for the two power generating technologies of the above results are discussed.

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