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RBS-Channelling Investigation of Radiation Damage and Diffusion of Krypton implanted into 6H-SiC

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Abstract content
   (Max 300 words)

The diffusion of krypton (Kr) implanted into 6H-SiC at three different temperatures, i.e. 23 deg;C (RT); 350 deg;C and 600 deg;C, was investigated using the RBS and channelling techniques. Implantation at 23 deg;C resulted in an amorphous SiC layer on the 6H-SiC. The higher temperature implantations retained the crystalline structure of 6H-SiC, with more distortions at 350 deg;C as compared to the 600 deg;C implantation. Sequential isochronal annealing for 5 hours in the temperature range 1000 deg;C – 1500 deg;C in steps of 100 deg;C was performed to assess the diffusion of the implanted Kr in 6H-SiC. For the room temperature implanted samples, diffusion of Kr did not start until 1200 deg;C, with significant diffusion taking place at 1300 deg;C. At 1400 deg;C, the diffusion was accompanied by the loss of Kr from the surface of the SiC. At 1500 deg;C, thermal etching of the SiC made diffusion measurements unreliable. Consequently, the activation energy of the Kr diffusion and pre-exponential factor were only determined in the temperature range 1100 deg;C – 1400 deg;C; and were E_a = 17.2×10⁻¹⁸ J and D₀ = 4.45×10⁻¹⁰ m²s⁻¹ , respectively. No diffusion took place in both the 350 deg;C and the 600 deg;C implanted samples in the annealing temperature range.

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Main supervisor (name and email)
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