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Electrical Characterisation of Electron Beam Exposure Induced Defects in Silicon

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Silicon (Si) is one of the most important semiconductor materials and it has been studied extensively. This is mainly due to its low cost, thermal stability, and good durability. It is because of these properties that Si is a suitable candidate for exploring the electron beam exposure (EBE) technique. The main aim of developing the EBE technique was to see if electron beam deposition (EBD) induced defects could be introduced in a controlled manner.Deep level transient spectroscopy (DLTS) and high resolution Laplace-DLTS were used to characterise the defects introduced in epitaxially grown p-type Si during electron beam exposure. In this process, Si samples were first exposed to the conditions of EBD without metal deposition (EBE). After EBE, Aluminium and Nickel Schottky contacts were fabricated using the resistive deposition method. For the Aluminium contacts, the defect level H(0.33) was identified as the interstitial carbon (C_i) related defect. It was a result of induced damage and could only be explained by the presence of donor-like traps. The capture cross-section was calculated to be 1.6×10^(-19) cm^(-2) from the Arrhenius plot shown in figure 1.The defect level observed using the Nickel contacts had an activation energy of H(0.55) with a capture cross-section of 6.6×10^(-14) cm^2. This defect has an activation energy similar to the I-defect. Pintilie et al observed a similar energy level, 0.545eV, with a capture cross-section of 1.7×10^(-15) cm^2 and 9.0×10^(-14) cm^2 after exposing their samples to high irradiation fluences. The defect level was detected using thermally stimulated current (TSC).

Are you currently a postgraduate student? (Yes/No)

Yes

At what level of studies are you currently? (Hons/MSc/PhD)

MSc

Please provide the name and email address of your supervisor.

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