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The effects of annealing on the quality of Pt Si Schottky contacts and the defects introduced in Si during electron beam deposition

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Abstract content
 (Max 300 words)

In this study current-voltage (I-V) and capacitance voltage (C-V) measurements were taken for Pt Schottky contacts on single crystal Si before it was annealed. This was done to identify the good contacts and the poorer ones. The Si contacts were then annealed at temperatures ranging from 50 to 600 degrees Celsius for 10 minute each. I-V and C-V measurements were then done on two of the best and two of the poorest metal contacts. Analysis shows that the ideality factor increased from 1.021 to 2.619 for the best Schottky contact and 1.652 to 4.559 for the poorer Schottky contact. The barrier height decreased from 0.788 to 0.674 for good contacts and from 0.629 to 0.609 for poor contacts. This showed that high temperatures impact negatively on the quality of the Schottky contacts and eventually the contacts fail. The defects introduced in Si during electron beam (EB) deposition of Pt Schottky contacts were characterized by deep level transient spectroscopy (DLTS). The main defects that were detected were the A-center (V-O pair) at EC - 0.17 eV, the E-center (V-P pair) at EC - 0.44 eV and a defect with an activation enthalpy at EC - 0.55 eV. Isochronal annealing (10 minute periods) revealed that the A-center is removed between 125 oC and 200 oC, but that the concentration of the E-center increased in this temperature range.

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