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An extensive study to observe the effects of thermal annealing and ion fluences in the ion beam synthesis of β-SiC P.R. POUDEL, B. ROUT, D.R. DIERCKS, F.D. MCDANIEL, University of North Texas, J.A. PARAMO, Y.M. STRZHEMECHNY, Texas Christian University — A systematic study of the formation of β-SiC structures by low energy carbon ion (C^-) implantation into Si followed by high temperature thermal annealing will be presented. The effects of thermal annealing in the formation of β-SiC structures has been studied. It is observed that the thermal annealing of 1100 $^\circ$C for 1 hr is required to observe the formation of β-SiC. The quantitative analysis in the formation of β-SiC nanostructures has been performed by the implantation of various carbon ion fluences in the range of 1×10^{17} - 8×10^{17} atoms /cm^2 at an ion energy of 65 keV into Si. It is observed that the average size of β-SiC crystals decreases whereas the amount of β-SiC increases monotonically with ion fluence up to a fluence of 5×10^{17} atoms/cm^2 and appears to saturate for a higher fluence of 8×10^{17} atoms/cm ^{2} when the samples were annealed at 1100 $^\circ$C for 1 hr. The stability of graphitic C-C bonds at 1100 $^\circ$C limits the growth of SiC precipitates in the sample implanted at a fluence of 8×10^{17} atoms /cm^2 which results in the saturation behavior of SiC formation in the present study as predicted by various characterization techniques such as FTIR, Raman, XRD, XPS and Transmission electron microscopy.

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