Contribution ID: **11** Type: **not specified**

INTERSTITIAL DEFECT REACTIONS IN P-TYPE SILICON IRRADIATED AT DIFFERENT TEMPERATURES

Monday 16 November 2009 15:05 (20 minutes)

In this work we present some new findings on the formation and annealing behavior of radiation-induced defects of interstitial type in p-silicon irradiated with 6 MeV electrons and alpha-particles of Pu-239 at temperatures of 78 K (LNT) and 273-295 K (RT). The samples studied were n+-p structures with a hole concentration in the base region from about 3×10ˆ12 cmˆ-3 to 6×10ˆ14 cmˆ-3. The low hole concentration allowed to minimize the injection annealing of primary defects upon electron irradiation by using the beam of low intensity.
The defect transformation kinetics have been studied using DLTS measurements. To monitor the mobile interstitial Si atoms we use a DLTS peak related to interstitial carbon Ci (Ea=0.29 eV).
We have found that after electron irradiation at LNT this peak begins to appear only after thermal annealing at temperatures higher than 300 K. The irradiation with alpha-particles at RT also keep self-interstitials immobile. However direct current injection resulted in complete transformation of self-interstitials to Ci already at 78 K. These facts indicate that silicon self-interstitials have very low mobility even at room temperature in p-Si, but become extremely mobile under electron injection.
It is shown that upon annealing of interstitial carbon in p-Si a metastable state for interstitial carbon-interstitial oxygen complex is formed. This state has an energy level of about Ev+0.36 eV. The formation of the stable and metastable states takes place concurrently. The observed features of the carbon-related complexes formation are likely related to the existence of different crystallographic orientation of the equiprobable pathways through which the interstitial carbon and oxygen atoms can approach each othe

Author: Dr MAKARENKO, Leonid (Belarusian State University)

Co-authors: Dr MURIN, Leonid (Scientific-Practical Materials Research Centre of NAS of Belarus); Dr MOLL, Michael (CERN); Dr LASTOVSKII, Stanislav (Scientific-Practical Materials Research Centre of NAS of Belarus)

Presenter: Dr MAKARENKO, Leonid (Belarusian State University)

Session Classification: Defect Characterization