

Defect generation and damage functions in electron irradiated silicon-dependence on particle energy

Monday 22 June 2015 10:40 (20 minutes)

The study of high resistivity n-type silicon diodes irradiated with electrons of energies ranging from 1.5 MeV to 27 MeV have enabled us to scan the generation, time evolution and generation rates of point defects and small defect clusters having a direct impact on the device performance over a large irradiation fluence range. It is shown that this offers the unique opportunity to follow the different formation of point and cluster defects as correlated with Non Ionizing Energy Loss NIEL calculated either with binary code (BCA) or molecular dynamics (MD) approaches. The generation of point defects is well described by the “classical NIEL”(BCA), the formation of small defect clusters is better described by the “Effective NIEL”(MD).

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Session Classification: Defect and Material Characterization