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Point and extended defects in silicon induced by electron irradiation –dependence on the particle energy

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The defect formation, from point defects to clusters, is scanned by performing irradiation with electrons of five different energies ranging from 1.5 MeV to 27 MeV. The radiation damage induced by electrons has been investigated in terms of radiation induced defects, their evolution in time and impact on the electrical performance of silicon diodes. Our investigations demonstrate that extended defects start to form already for electrons with energy of 1.5 MeV. The direct impact of the trivacancy (V3) defect on the leakage current is confirmed. From this correlation, the capture cross section for holes of the V3 center in the single acceptor state is determined.In addition, similar to V3 small cluster, there are indications that there are other cluster related defects (the H centers) changing their configuration at ambient temperature and influencing the Neff. Preliminary results obtained by EPR and HRTEM will be presented as well.

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