**Microscopic mechanism responsible for radiation-enhanced diffusion**

**of impurity atoms**

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**Abstract**

Modelling of radiation-enhanced diffusion (RED) of boron and phosphorus atoms during irradiation of silicon substrates respectively with high- and low-energy protons was carried out. The results obtained confirm the previously arrived conclusion that impurity diffusion occurs by means of the ‘impurity atom – intrinsic point defect’ pairs and that the condition of the local thermodynamic equilibrium between substitutional impurity atoms, nonequilibrium point defects created by irradiation, and the pairs is valid. It is shown that using RED, one can form a special impurity distribution in the semiconductor substrate including retrograde profiles with increasing impurity concentration in the bulk of the semiconductor. In addition, modelling of radiation-induced segregation of nitrogen implanted in stainless steel modified by titanium is carried out. It is shown that vacancy-impurity complexes are responsible for nitrogen diffusion in an implanted layer excluding the ‘tail’ region. The calculations performed give clear evidence in favour of further investigation of various doping processes based on RED, especially the processes of plasma doping, to develop a cheap method for forming specific impurity distributions in the near surface region.

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