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On the bistability of the Boron related donor associated with the acceptor removal process in irradiated p-type silicon

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Silicon based sensors suffer from a phenomenon called "Acceptor removal"when exposed to high fluences of radiation. This "acceptor removal"process implies the elimination of the dopant element from the substitutional place (e.g., boron for p-type silicon) and combining with a different particle, obtaining an electrical active defect complex (in the case of boron-doped p-type silicon, obtaining an acceptor level from the new defect). This change of doping affects the macroscopic electrical properties and performances of the devices. It was found previously observed that an irradiation induced defect containing Boron and acting as a donor (assumed to be the BiOi complex) is bistable, impacting thus on the determined acceptor removal rate in p-type silicon. The defect can exist in at least two configurations, labelled as A and B in the following. The present work focus on studying the conditions the defect can change its configuration. CV measurements after different excitation conditions of the samples, at different temperatures allow us to determine the frequency factors and activation energies required for the defect to change the configuration from A to B and back.

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