EPR DIAGNOSTICS OF DEFECT AND IMPURITY DISTRIBUTION HOMOGENEITY IN SEMI-INSULATING 6H-SiC

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S u m m a r y

The homogeneity of the distribution of impurities and defects in a 6H-SiC wafer cut out from a nominally undoped 6H-SiC ingot grown by the physical vapor transport (PVT) method at the Bandgap Technologies Inc. (USA) has been studied making use of the electron paramagnetic resonance (EPR) and photo EPR methods at a frequency of 37 GHz and the temperature $T = 77$ K. The researches of the EPR and photo EPR spectra of eleven samples cut off from the wafer have shown that the type of conductivity in the nominally undoped 6H-SiC ingot varies from p- to n-type along the growth direction, so that only the middle section of the ingot is characterized by a semi-insulating (SI) behavior due to the mutual compensation of donors and acceptors. In the samples cut off from the middle section of the wafer, the photoresponse of donor and acceptor EPR spectra demonstrates a persistent relaxation effect after the photoexcitation has been turned off, which is a typical characteristic of SI materials. Two intrinsic defects in SI 6H-SiC samples have been found and studied. On the basis of spectroscopic and energy characteristics of defects, one of them was associated with a carbon vacancy in the positive charge state, V_C^+, while the other was attributed to a silicon vacancy in the negative charge state, V_{Si}^-.