Vacancy defects induced in Germanium by proton irradiation
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Abstract

In the last few years a growing interest has been devoted to germanium investigation as a base for improving the performance of electronic devices. However, in contrary to silicon where the intrinsic and extrinsic properties have been extensively studied and determined, very little work has been done on germanium. It is only in the last few years that germanium truly has been reinstated as a material worth studying within the semiconductor physics community.

In this present work, we study vacancy defects in several sample of n-type Ge(110) bulk crystals doped with Sb. In order to characterize the defects in trace region induced by 12 MeV H ions in these samples, positron lifetime spectroscopy and slow positron beam coupled with Doppler broadening spectrometry have been used.

Our results show that the nature of the induced vacancy defects changes as function of the fluence. For a H fluences of $10^{14}$ cm\textsuperscript{-2} and $10^{17}$ cm\textsuperscript{-2} respectively, a monovacancy and negatively charged divacancy have been detected.

Keywords: germanium, positron annihilation spectroscopy; vacancy defects; monovacancy, divacancy, proton irradiation