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Impurity distribution in high purity germanium crystal and its impact on the detector performance. GUOJIAN WANG, Department of Physics, University of South Dakota, MARK AMMAN, Ernest Orlando Lawrence Berkeley National Laboratory, University of California, HAO MEI, DONGMING MEI, Department of Physics, University of South Dakota, KLAUS IRMSCHER, Leibniz Institute for Crystal Growth, YUTONG GUAN, GANG YANG, Department of Physics, University of South Dakota — High-purity germanium crystals were grown in a hydrogen atmosphere using the Czochralski method. The axial and radial distributions of impurities in the crystals were measured by Hall effect and Photo-thermal ionization spectroscopy (PTIS). Amorphous semiconductor contacts were deposited on the germanium crystals to make detectors. Three planar detectors were fabricated from three crystals with different net carrier concentrations (1.7, 7.9 and 10x1010 cm-3). We evaluated the electrical and spectral performance of three detectors. Measurements of gamma-ray spectra from 137Cs, 241Am and 60Co sources demonstrate that the detectors have excellent energy resolution. The relationship between the impurities and detector's energy resolution was analyzed. Keywords: High-purity germanium crystal, High-purity germanium detector This work is supported by DOE grant DE-FG02-10ER46709 and the state of South Dakota..

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