Spectrometry of Electron Irradiated CdTe Schottky-Barrier Semiconductor Detectors before Polarization Onset

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Abstract. CdTe Schottky-barrier semiconductor detectors suffer from the so-called polarization effect accompanied by a sudden deterioration of their spectrometric characteristics with the time of biasing. The polarization onset can be characterized by the polarization time t_P, whereby to ensure a reliable long-term operation of detectors, high polarization times are required. In this paper we have studied the effect of 5 MeV-electron irradiation on the polarization time as well as on the detector spectrometry during the stable operational phase before polarization onset. The 59.5 keV-photopeak position in ^{241}Am radioisotope source spectra acquired at the reverse bias voltages of 300 V, 400 V and 500 V was followed as a function of time for different applied doses from 0.5 up to 2.25 kGy. We have demonstrated that the applied doses decrease gradually the polarization times and increase the slope of the peak shift in the stable period. After detectors irradiation with the highest dose of 2.25 kGy, the polarization effect occurs practically immediately after applying the reverse bias voltage.