Gamma Spectrometry of Different Energies by Radiation-Degraded SI GaAs Detectors

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Abstract. We fabricated the semi-insulating GaAs detectors suitable for gamma ray measurements. Their radiation hardness was studied measuring gamma rays of various energies before and after their degradation by 5 MeV electrons in the range of doses from 164 to 2000 kGy. The signal from registered photos emitted by ^{241}Am and ^{133} Ba gamma sources was rapidly approaching the noise level with increasing dose. Evaluated charge collection efficiency of detectors was decreasing from initial 74% at reverse bias of 200 V down to about 16% after 2000 kGy applied. It was observed that the signal from 31 keV photons blends with noise at 1000 kGy, the 60 keV at 1500 kGy and the 356 keV photons were detectable by detector after its degradation by our maximal applied dose of 2000 kGy. The influence of photon energy on spectrometry of radiation degraded GaAs detectors was proven in connection to detector charge collection efficiency.