Analysis of CdTe Detectors Via Alpha and Gamma Spectrometry

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Abstract. Cadmium telluride (CdTe) plays a pivotal role in both renewable energy (solar cells) and radiation detection (infrared and X-ray/gamma-ray detectors). This semiconductor has a bandgap energy of approximately 1.5 eV, allowing devices based on it to operate at room temperature. Its high density and available large thickness of high-quality crystals facilitates exceptional gamma ray and X-ray absorption among other semiconductor materials. In this paper, CdTe detectors with metal-semiconductor-metal structure were investigated. The structure featured an In/Ti Schottky contact on one substrate side and an ohmic Pt contact on the opposite side. Spectra of alpha particles generated with ^{238}Pu ^{239}Pu ^{244}Cm triple source and ^{241}Am gamma spectra were measured under various reverse bias voltages applied on detector in the range 10-110 V. Analyzing gamma and alpha spectra, we extracted valuable information about the quality of investigated CdTe detectors. Characteristics such as charge collection efficiency, energy resolution and detection efficiency were evaluated and compared for alpha and gamma ray detection.