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Charge Transport Properties in CZT Detectors Grown by the Vertical Bridgman Technique

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Great efforts are being presently devoted to the development of CdTe and CdZnTe detectors for a large variety of applications, such as medical, industrial, and space research. We present the spectroscopic properties of some CZT crystals grown by the standard vertical Bridgman method and by the boron oxide encapsulated vertical Bridgman method, which has been recently implemented at IMEM-CNR. By this technique the crystal is grown in an open quartz crucible fully encapsulated by a thin layer of liquid boron oxide. This technique prevent the crystal-crucible contact allowing larger single grains with lower dislocation density to be obtained. Several mono-electrode detectors were realized with two planar gold contacts. The samples are characterized by an active area of ≈4x4 mm^2 or ≈7x7 mm^2 and with thickness ranging from 1 to 2 mm. The charge transport properties of the detectors have been studied by mobility-lifetime ($\mu\tau$) product measurements, carried out at the European Synchrotron Radiation Facility (Grenoble) in PTF configuration, where the impinging beam direction is orthogonal to the collecting electric field. We have performed several fine scans between the electrodes with a beam spot of 10x10 μm^2 at different energies from 60 keV to 400 keV. In this work we present the test results in terms of $\mu\tau$ product of both charge carriers and an evaluation of the spectroscopic response uniformity across the sensitive volume of tested samples.