

Abstract Submitted  
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**Defect Measurements and Performance Testing of CZT Detectors Using I-DLTS, TCT, I-V, C-V and  $\gamma$ -Ray Spectroscopy** RUBI GUL, Idaho State University, ZHENG LI, BNL, KARA KEETER, RENE RODRIGUEZ, ISU, RALPH JAMES, BNL — Performance testing and the measurement of the defect levels of CZT detectors from different manufacturers are investigated by means of I-DLTS (Current Deep Level Transient Spectroscopy), TCT (Transient Charge Technique), I-V, C-V and  $\gamma$ -Ray Spectroscopy. Studies include measuring defects parameters such as energy levels in the band gap, carrier capture cross-section and defect density have been determined by using I-DLTS. The space charge density, induced current and collected charge were obtained by using TCT. Detector's electric characteristics and detection performance tests are carried out by using I-V, C-V and  $\gamma$ -Ray Spectroscopy. I-DLTS data is collected in the temperature range of 10-330 K. Different mid-band energy traps, ranging from  $E_c-0.01$  eV to  $E_c-0.31$  eV, mostly native acceptor defects, are identified. The TCT parameters are obtained by measuring laser induced current transients with 50-1100 V bias voltages across the detector. The maximum value of collected electrons and the typical measured space charge density, at 1100V is found of the order of  $10^{10}$ . Resistivity, performance and depletion of the detectors are determined by I-V and  $\gamma$ -Ray Spectroscopy.

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