Abstract Submitted
for the SES13 Meeting of
The American Physical Society

Atomic Force Microscopy (AFM) of Ion – Irradiated Cadmium Zinc Telluride Crystals STEPHEN BABALOLA, MADHU GOUNDLA, CHARLES PAYTON, RYAN GIVENS, Alabama A&M University, CLAUDIU MUNTELE, Cygnus Scientific Services, MARIE-THERESE OUMBA, Alabama A&M University, MICHAEL GROZA, Fisk University, TRENT MONTGOMERY, Alabama A&M University, CYGNUS SCIENTIFIC SERVICES COLLABORATION, FISK UNIVERSITY COLLABORATION — Cadmium Zinc Telluride (CZT) is considered a good candidate material for radiation detectors. However, current technology has difficulties in growing large dimension single crystals. Also, leakage (dark) currents along grain boundaries and device surface are still a big issue. In this study, we used AFM to study the changes to the surface topography of CZT crystals irradiated with Pt ions at 180 keV and 1.6×10^{11} ions/cm^2. The initial CZT sample is prepared by polishing and baseline AFM topographic images are taken, monitoring the values for the average roughness and root mean square. The CZT sample is then treated by etching with 2% bromine methanol (BM) followed by average roughness and root mean square AFM measurements. Next, the sample is irradiated with Pt ions and measured with AFM. The results show that the surface after irradiation has a smaller roughness and fewer morphology features than before irradiation. Current-voltage electrical measurements were also taken at each preparation stage and correlated with the AFM results. Finally, radiation detectors based on the CZT samples were fabricated and tested for response to radiation. The effects of the Pt irradiation on the radiation detector performance is discussed.

Stephen Babalola
Alabama A&M University

Date submitted: 27 Sep 2013 Electronic form version 1.4