

SUBMIT TO: AM140, James
Hard X-Ray and Gamma-Ray Detector Physics III

ABSTRACT TITLE:
Alpha Particle Response Characterization of CdZnTe

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ABSTRACT TEXT:

The coplanar-grid as well as other electron-only detection techniques are effective in overcoming some of the material problems of CdZnTe and, consequently, have led to efficient gamma-ray detectors with good energy resolution while operating at room temperature. The performance of these detectors is limited by the degree of uniformity in both electron generation and transport. Despite recent progress in the growth of CdZnTe material, small variations in these properties remain a barrier to the widespread success of such detectors. Alpha-particle response characterization of CdZnTe crystals fabricated into simple planar detectors is an effective tool to accurately study electron generation and transport. We have used a finely collimated alpha source to produce two-dimensional maps of detector response. A clear correlation has been observed between the distribution of precipitates near the entrance contact on one crystal and its alpha

response map. Further studies are ongoing to determine the mechanism for the observed response variations and the reason for the correlation. This paper presents the results of these studies and their relationship to coplanar-grid gamma-ray detector performance.

KEYWORDS: coplanar grid, CdZnTe, gamma-ray detector, alpha particle, material non-uniformity

BRIEF BIOGRAPHY:

Mark Amman received a B.S. degree in electrical engineering from Kettering University in 1987 and a Ph.D. in applied physics at the University of Michigan. He is currently a staff scientist at LBNL where his main interest is in developing Ge- and CdZnTe-based radiation detectors.