



Neutron Detection Using Gadolinium-Based Diodes

By Benjamin R. Thomas

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x6 mm. This item is printed on demand - Print on Demand Neuware - P-n heterojunction diodes consisting of a thin n-type layer of Gd₂O₃ deposited on both p-type Si and p-type 4H SiC substrates were explored as possible solid-state neutron detectors. 79 keV internal conversion electrons from the de-excitation of the meta-stable Gd-158 nucleus can create ionization in the depletion region of the reverse-biased diodes resulting in a detectable signal. The diodes were modeled with Davinci software to determine the feasibility of signal detection above the reverse-bias leakage current. A CASINO simulation showed that less than one percent of the internal conversion electrons deposit their full energy within the achievable depletion region. After depositing contacts on samples prepared at the University of Nebraska, Lincoln, the diodes were exposed to thermal neutron fluxes of approximately 10 n/cm s in the AFIT Standard Graphite Pile and 10₂ n/cm s in the thermal column of the Ohio State University Research Reactor. Pulse height spectra collected during irradiations at various reverse bias voltages ranging from - 0.5 V to -5.0 V revealed no discernable neutron induced features. Oscilloscope traces captured during the high thermal neutron...



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