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Neutron Detection Utilizing Gadolinium Doped Hafnium Oxide Films

By Bryan D. Blasy

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x4 mm. This item is printed on demand - Print on Demand Neuware - Gadolinium (Gd) doped hafnium oxide (HfO₂) was deposited onto a silicon substrate using pulsed laser deposition. Synchrotron radiation was used to perform Gd L3-edge extended X-ray absorption fine structure (EXAFS) measurements on 3%, 10%, and 15% doped HfO₂ samples. The interatomic distances determined from Fourier transformation and fitting the data show Gd occupying the hafnium site in the HfO₂ lattice, there was no clustering of Gd atoms, and the Gd ion retains monoclinic local symmetry for all levels of doping. Current as a function of voltage experiments identified the films as having poor diode characteristics with high leakage current in the forward bias region. However, a proper bias (0.5 V) for the purpose of neutron detection was identified and applied across the diodes. Using a high, non-varying neutron flux in a nuclear reactor, Gd doped HfO₂ was able to be used in a detection system and displayed the ability to detect neutrons. 60 pp. Englisch.



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