Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Resistive all boron carbide neutron detectors[1] ELLEN DAY, MANUEL DIAZ, CAROLINA ILIE, SHIREEN ADENWALLA, Mechanical Engr., Physics and Astronomy and CMRA, Univ. of Nebraska-Lincoln — Semiconducting boron carbide is a promising material for true solid-state neutron detection [1]. An all boron carbide (BC) layer was deposited on sapphire (Al_2O_3) with sputtered Chrome/Gold electrical contacts. Resistance vs. temperature measurements indicate a $T^{-3/2}$ dependence and a band gap of $\sim$ 0.17eV. X-ray diffraction measurements confirm the similarities in crystal structure of the films grown on Al_2O_3 and Si. Detection area ranged from 0.25mm^2 to 1mm^2 and the thickness of the films ranged from 280nm to 600nm. Neutron detection measurements show no sharp spectral peaks but a long high energy tail which increased in counts as the reactor power was increased, in agreement with both monte carlo simulations and simple model calculations [2]. The low thermal neutron capture cross section of Al and O ensures that the entire neutron signal observed is from the resistive boron carbide layer, thus demonstrating the fabrication of an all boron carbide neutron detector. We show plots as a function of reactor power and thickness. [1] B.W. Robertson, S. Adenwalla, A. Harken, et al., *Appl. Phys. Lett.* **80**, 3644 (2002). [2] C. Lundstedt, A. Harken, E. Day, B. W. Robertson, S. Adenwalla, submitted to NIM.

[1]Work is funded by the State of Nebraska, ONR [N00014-04-1-0605] and NASA.

Shireen Adenwalla

Date submitted: 04 Dec 2005 Electronic form version 1.4