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Neutron detection in boron carbide/Si heterojunctions as functions of time constants and bias voltage[1] NINA HONG, JOHN MULLINS, S. ADENWALLA, Physics and Astronomy, Unv. of Nebraska-Lincoln — True solid-state neutron detectors have the potential to achieve high efficiencies at low mass, size and power. [1,2] Such detectors made from semiconducting boron carbide (BC) allow for neutron capture and charge collection in the same layer. Here we report neutron detection results from p-n heterojunction diodes of boron carbide on n-type Si. Neutron capture efficiency increases with time constant and reverse bias, from 0.15% at 0 bias and short time constant to 0.46% at 19 V and long time constant. Increasing reverse bias increases the depletion width in the BC layer, leading to a higher proportion of charge capture. The long time constants allow for the detection of charge capture in the BC-scope traces show charge capture times of ~ 30 μs (as compared to <20 ns in Si). These results indicate that the BC layer is playing an active role in neutron detection, capturing neutrons as well as charge. [1] B. W. Robertson, S. Adenwalla, et al., APL, 80, 3644 (2002). [2] E. Day M. J. Diaz, and S. Adenwalla, J. Phys. D: Appl. Phys. **39,** 2920 (2006).

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