



Project Title

Microfabricated Neutron Detectors

Project Reference Code: DNDO-LLNL-Nikolic

Hosting Site

Lawrence Livermore National Laboratory
Livermore, CA

Project Description

Our team is demonstrating that microscale materials can be fabricated to produce a high-efficiency thermal neutron detector. Our device, called the Pillar Detector, promises to achieve high efficiency without the deployability issues associated with conventional ^3He tube detectors. The Pillar Detector relies on a carefully constructed platform of etched silicon pillars that are interspersed with ^{10}B . Incoming neutrons strike the boron nuclei, yielding reaction alpha and lithium particles that interact with the semiconductor to induce a measurable electrical current. The pillar etching depth can be adjusted to provide a thicker boron layer for high-neutron capture. The spacing between the pillars can also be optimized so that the reaction particles don't have to travel far, yielding a high efficiency. Currently, the device yields an efficiency of 40% - 50%. Presently, the work is focusing on material science aspects of boron processing, device integration and physics, modeling of the device performance, and scaling of the device for high efficiency. Graduate students majoring in Electrical or Nuclear Engineering or Material Science with interest in detector characterization, packaging and integration with read-out electronics would be an ideal fit.

Disciplines

Material Science Engineering
Nuclear Engineering
Chemical Engineering

Mentor(s)

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Internship Coordinator

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The name and contact information of the hosting site internship coordinator is provided for further assistance with questions regarding the hosting site; local housing availability, cost, or roommates; local transportation; security clearance requirements; internship start and end dates; and other administrative issues specific to that research facility. If you contact the internship coordinator, identify yourself as an applicant to the DNDO Summer Internship Program.

Interns will not enter into an employee/employer relationship with the Hosting Site, ORAU/ORISE, DHS, DNDO or DOE. No commitment with regard to later employment is implied or should be inferred.