NE-26-39278 Overcoming the Material-Growth Barrier for Fabrication of a Novel Semiconductor Neutron Detector for Advanced Nuclear Power Plants

Srijan LLC, located in College Station, TX, is developing the N800 semiconductor neutron detector to enable high-temperature neutron detection for advanced reactors. However, current neutron sensitive semiconductor materials contain carbon impurities that severely degrade charge collection efficiency, preventing reliable neutron detection performance and blocking advancement beyond a proof-of-concept stage.

Srijan will work with Sandia National Laboratories (SNL) to grow thick-neutron-sensitive-films using carbon-free methods. This project will enable next-generation neutron detectors capable of operating at temperatures up to 800°C, significantly exceeding the limits of current He-3 detectors and scintillators used in advanced reactors. The compact, high-temperature-capable N800 detector could improve reactor safety through real-time neutron flux monitoring and autonomous reactor controls while reducing instrumentation complexity and cost for advanced reactor systems.