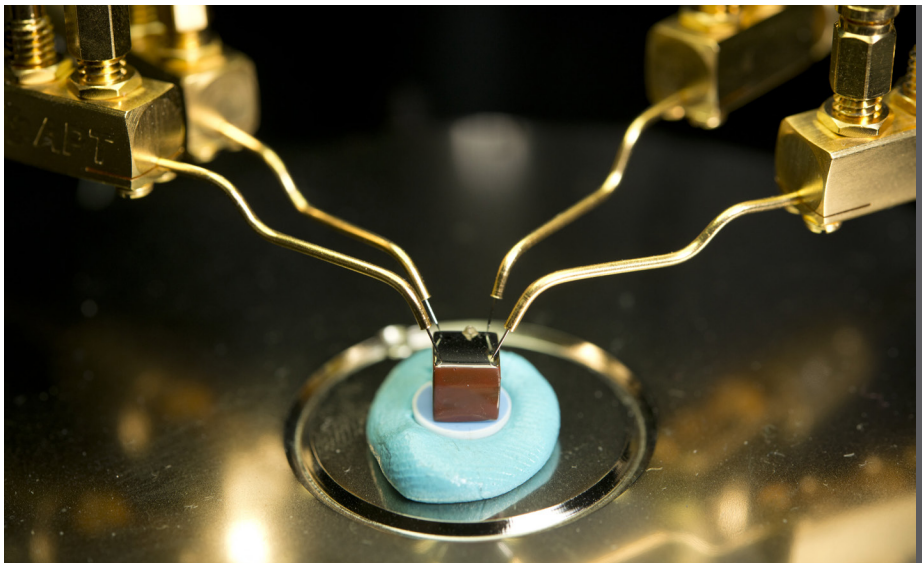
LISe™ Crystals



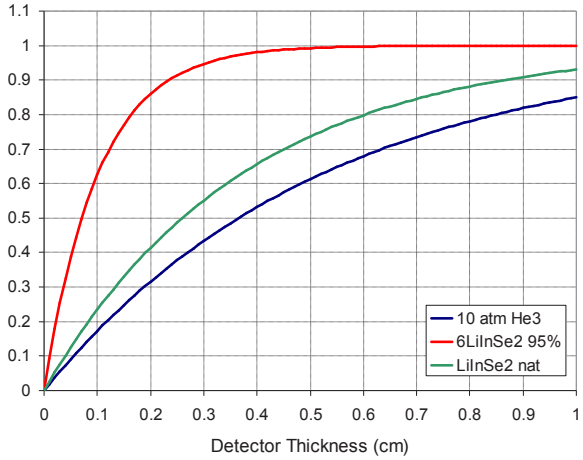
The Li-containing compound semiconductor thermal neutron detector is based on the $^{6}LiInSe_2$ single crystal. A novel ^{6}Li chemical purification method and proprietary two-step synthetic process that starts from elementary materials (Li, In and Se) yield large radiation detection quality crystals of $^{6}LiInSe_2$. The harvested crystal also must exhibit the appropriate electrical bandgap, high bulk resistivity and current stability. These ^{6}Li-containing chalcopyrite-type semiconductor crystals efficiently detect thermal neutrons at room temperature by either direct semiconductor conversion of $^{6}Li(n,\alpha)$ charged particles or detection of scintillation photons via a coupled solid state photodetector.

DETECTOR / SENSOR / IMAGING

Features

$^{6}LiInSe_2$ crystal properties:

- Band gap: 2.8 eV
- Bulk resistivity: $>10^{12}$ Ω*cm
- Optical transmission: 60%
- High thermal neutron efficiency

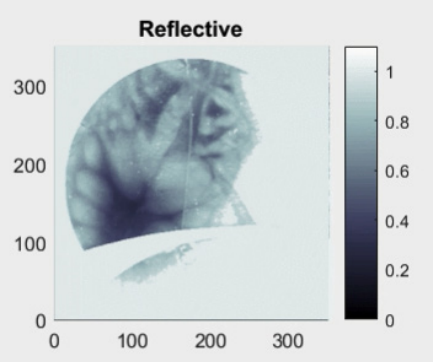


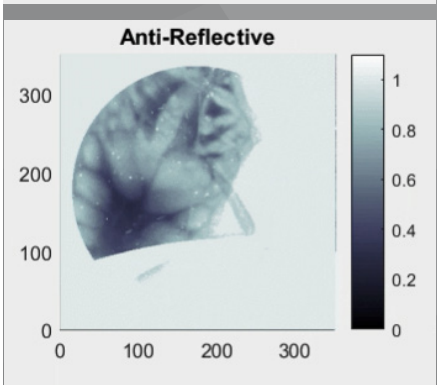
Benefits

- Compact, low cost, low energy
- All solid state detection
- Versatile design for a wide range of applications (hand-held, high resolution, bulk counter, imaging)
- High intrinsic gamma/neutron discrimination

Applications & Industries

- Neutron science facilities or neutron detection and imaging entities will be interested in increased spatial resolution and detection efficiency possible.
- Industrial firms in the oil industry and transportation providers would be interested in the detection and security benefits.
- Government agencies with research or operational interest in nuclear nonproliferation, radiation detection and homeland security.
- Non-linear optics.
- Medical imaging.





Patents & Awards

- U.S. Patent Nos. 7,687,780; 9,334,581; 9,429,662; 9,632,190; 9,638,809; 9,638,813; 9,499,406; 9,658,350; 9,612,345; 10,054,697 B1 and 10,114,131
- U.S. Patent Application 16/055,896
- R&D 100 Award

Inventors

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Technology Readiness Level (1–9)

7

$^{6}LiInSe_{2}$ crystals of sufficient size and bulk electrical properties are readily made in the laboratory, and detection of ionizing radiation has been successful with rudimentary detector archetypes.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
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(865) 241-5981
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