Crystal Growth of Scintillators: Understanding Defects and Dopants

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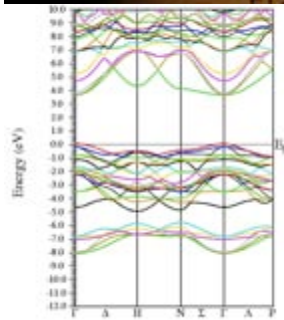

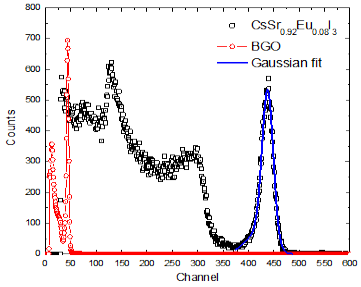

Existing Collaborations

- Sigma-Aldrich: raw materials quality
- LLNL: valence state of luminescence centers
- Siemens Medical Solutions, Molecular Imaging

Broader Impact

- Pertaining to the basic societal issues of healthcare, security, and energy
- Developing a new graduate course “Scintillation materials and methods for their synthesis”
- Addressing the shortage of students entering careers in crystal growth

Proposed Research Project

1. Fundamental study of defect formation during crystallization of new inorganic radiation detectors,
2. Effect of defects on: a) scintillation processes, b) physical properties,
3. Compensation and/or elimination of defects by co-dopants

Milestones

1) EXPERIMENTAL

- Crystal growth: via the Bridgman method
- Characterization: optical, scintillation (thermoluminescence) and physical (hygroscopicity, fracture toughness)

2) THEORETICAL

- DFT calculations of the electronic energy level perturbations caused by defects and dopants