Sandia National Laboratories

Fracture-Resistant Lanthanide Scintillators

SAND2012-1147P

POTENTIAL APPLICATIONS

Ionizing Radiation Detection

Strengthening Crystal Lattices

Lanthanide Halide Compositions

Scintillators

Medical Devices

Nuclear Power

BENEFITS

Fracture Resistance

Enhanced UV Florescence

Short Decay Lifetime

Strengthened Lattice

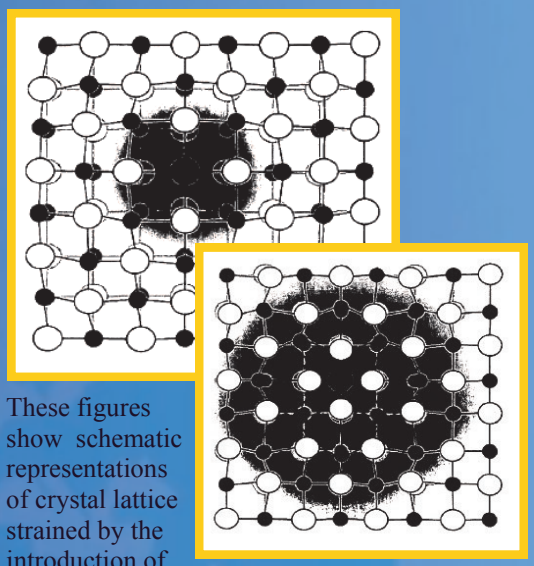
High Anisotropic Plasticity

INTELLECTUAL PROPERTY

US PATENT # 7,863,572
(SD #10384)

TECHNOLOGY SUMMARY

Lanthanide halide alloys have recently enabled scintillating gamma ray spectrometers to be comparable to room temperature semiconductors (< 3% FWHM energy resolutions at 662 keV). However brittle fracture of these materials occurs during cooling and hinders the growth of large volume crystals. Efforts to improve the strength through non-lanthanide alloy substitution, while preserving scintillation, have been demonstrated at Sandia. The Sandia tested alloys not only demonstrate the needed strength and fracture resistance that prior art compounds lack, but also exhibit bright fluorescence under UV excitation, with varying shifts in the spectral peaks and allow scintillation when coupled to a photomultiplier tube (PMT) during exposure to 137Cs gamma rays.



These figures show schematic representations of crystal lattice strained by the introduction of isolvalent cation and aliovalent cation with ionic radii slightly larger than the host cations

TECHNOLOGY READINESS LEVEL

Sandia estimates this technology at approximately a TRL 4. Key concepts of this technology have been demonstrated in the laboratory environment.

LICENSING CONTACT

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National Nuclear Security Administration

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SAND # 2011-xxxx