

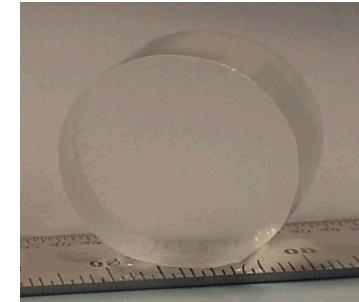
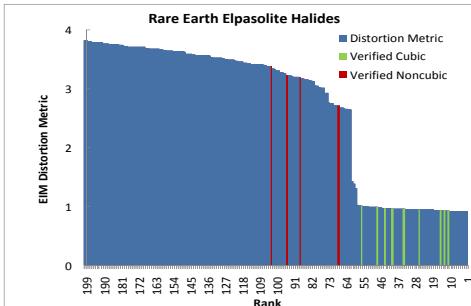
Accelerated Discovery of Elpasolite Scintillators

High-level summary of effort

- SNL is carefully evaluating the elpasolite system of rare earth compounds for promising scintillators to be used as gamma ray spectrometers with properties that enable low-cost fabrication
- SNL has demonstrated compound synthesis, crystal growth, and evaluation of structure and properties of new scintillators and discovered new intrinsic scintillator $\text{Cs}_2\text{NaGdBr}_6$
- This is a broad effort where VNIIA, as the collaborating Russian laboratory, could take any of a number of roles that would advance the technology development

Importance of this work

- Low-cost, high-performance gamma-ray spectrometers are needed for enforcing treaties and detecting smuggling of nuclear materials
- Available scintillation materials fall short of requirements for energy resolution and sensitivity
- This is a currently funded NA-22 project



Anticipated team

- US: SNL – F.P. Doty assisted by X.W. Zhou and P. Yang to outline VNIIA contributions and negotiate an agreed upon collaboration
- Russia: VNIIA – the portion of this work might be done in Russia at no expense to the US and VNIIA is the most likely Russian laboratory

Costs:

- On-going US project
- Assuming continued funding from NA-22, the incremental cost of this project would be 0.1 FTE plus travel to Russia

Nuclear Warhead Security Principles

High-level summary of effort

- SNL and VNIIA will draft a set of joint US-Russia Nuclear Warhead Security Principles that will articulate high-level best practices for warheads in storage and transportation.
- This effort will articulate a shared vision of the objectives and fundamental principles related to NW security.
- This work was ongoing between SNL and VNIIA under a previous US-Russia government-to-government agreement but was not completed prior to the agreement's expiration.

Importance of this work

- Expected outcome
 - A set of agreed-to security principles (i.e., "best practices") authored by the two major NW states with respect to nuclear warheads in storage and during transportation.
 - Work may provide a means to engage (at a later date) other members of the P5 on NW-related issues.
- Contribution
 - Development of a set of nuclear weapon security principles, in a manner similar to the IAEA's "Fundamental Safety Principles" and "Code of Conduct on the Safety and Security of Radioactive Sources."

Anticipated team

- U.S.
 - NNSA laboratories: SNL (Joe Saloio, others)
- Russia
 - VNIIA (Andrey Sviridov, others)

Levels of Effort

- On-going US project
- This project is amenable to no funds exchanged, as an outline of the paper already exists and much of the work needed to complete the paper can be conducted without face-to-face interaction.
- SNL subject matter expert effort plus limited travel to Russia.

Extended MHD Modeling

High-level summary of effort

- Advance the theoretical and computational efforts in the area of extended MHD modeling to better understand the dynamics of liner implosions.
- SNL studying cylindrical isentropic compression experiments and magnetized liner implosion experiments on Z. Accurate models are needed for understanding liner dynamics.
- Improvements will be important for existing experimental capabilities and in the future for the proposed BAIKAL facility.

Importance of this work

- New theoretical and computational approaches are needed to accurately model liner dynamics in converging geometry.
- New approaches provide more accurate physical modeling of experiments.
- Better understanding will lead to more rapid progress in cylindrical isentropic compression and cylindrical implosion experiments.

Anticipated team

U.S.

- NNSA laboratories: SNL (T. Gardiner, M. Martin)

Russia

- VNIIEF and VNIITF

Levels of Effort

- On-going US project
- This project is amenable to no funds exchanged, as it mainly involves sharing theoretical approaches and simulation results.
- MHD subject matter expert effort plus limited travel to Russia.