SAND2016-5032C

Left: The Source Physics Experiment (SPE) team utilizes HH Seismic's unique Seismic Hammer instrument, a 27-metric ton, 25-foot tall seismically-modified pile driver that creates impulsive, large-amplitude, spectrally broadband seismic waves non-explosively to complete field operations at the Nevada National Security Site (NNSS).

Bottom: Similar physics between large-scale explosive tests (Fig. 1a) and micro-scale laser ablation (Fig. 1b) suggest a connection. The Physics Analogues project seeks to establish a correspondence between the two events through experimental (Fig. 1c) and modeling (Fig. 1d) efforts and thereby provide a highly flexible, well controlled, and data rich platform for study of the fundamental interactions at the heart of esplosive events.

PROLIFERATION DETECTION RESEARCH AND DEVELOPMENT

Fig. 1a

Fig. 1b

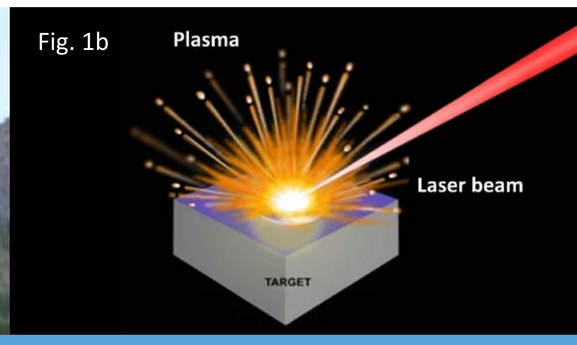

Fig. 1c

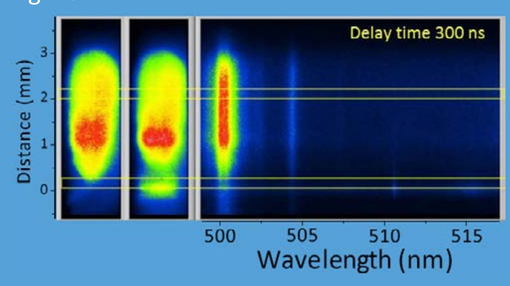

Fig. 1d

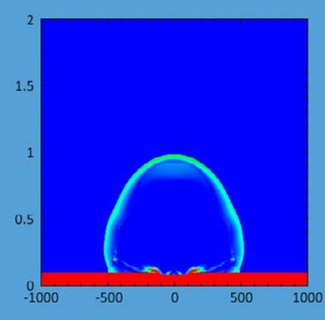

Fig. A

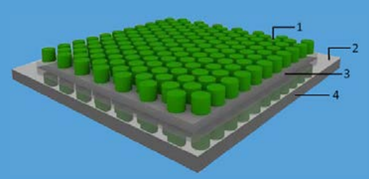

Fig. B

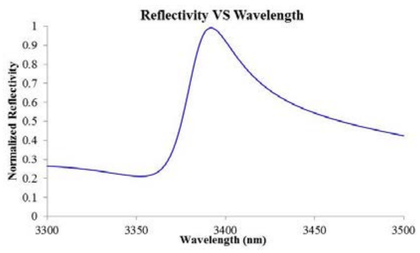

Fig. C

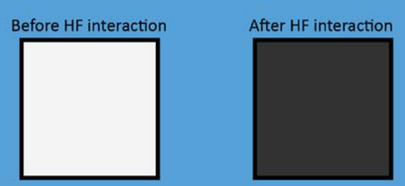

Fig. 2a

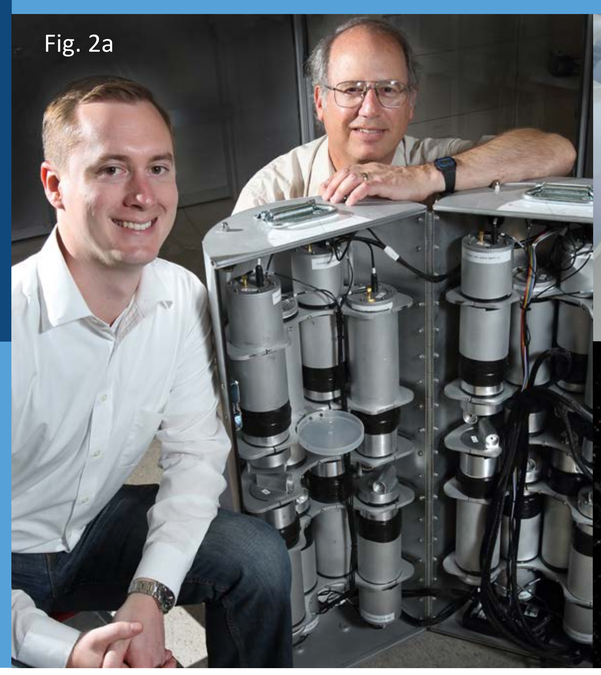

Fig. 2b

Fig. 2c

Material Production Detection and Monitoring

Nanoprous Framework Materials for Separation and Adsoption of Gaseous Species | Signatures for Advanced Nuclear Weapons Designs | Porous Materials for the Separation and Sequestration of Fission Gases | Multi-axis sensing to locate and characterize pyroprocessing operations | Micro-Scale Automation Platform | HERTZ -NW Neutron Generator Signatures Detection | Remove Conversion

Weapons Development Detection and Security

Advanced Tools for Maintaining Continuity of Knowledge | GADRAS Development | Radiography Behind an Information Barrier for Warhead Verification | Advanced materials for gamma-ray detectors | WMS Technology Roadmap | Information Barriers for Imaging | Directional Spectrometer Software | Warhead Monitoring Planning and Execution

Enabling and Cross-Cutting Technologies

PARAKEET-Electromagnetic Emanations Modeling Image Based Algorithms | HARD Solids
Advanced SAR and Signal Processing Capabilities

Fig. A. The device geometry is illustrated for a concentric Guided-Mode Resonance Filter (GMRF). The geometry consists of four concentric layers. A layer of Si3N4 pillars (1) rests on top of an SiO2 buffer layer (2). Surrounding these is a reflective metallic layer (3). The sub-strate is Si (4).

Fig. B. The spectrally-resolved reflectivity is shown as a function of wavelength. The peak of the reflectivity rests at 3390 nanometers, with an amplitude of ~98%. The geometry of the resonant grating forces orthogonal incident polarizations to demonstrate the same reflectivity profile.

Fig. C. The spectrally-resolved reflectivity is shown as a function of wavelength. The peak of the reflectivity rests at 3390 nanometers, with an amplitude of ~98%. The geometry of the resonant grating forces orthogonal incident polarizations to demonstrate the same reflectivity profile.

Fig. 2a. MINER system consisting of sixteen liquid scintillator detector cells configured in a height-staggered cylindrical geometry.

Fig. 2b. Uranium hexafluoride (UF6) is a significant chemical with respect to nuclear proliferation as it is the feedstock for most uranium enrichment processes, including centrifuges. Above is the UF6 container and you can read the words "uranium hexafluoride" on the side of the container in the middle.

Fig. 2c. Scientist and engineering from across the DOE complex participate in joint large scale explosive experiments, like this explosion at the NNSA Nevada National Security Site, in support of sensor development and validation for DNN R&D missions

National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2016-XXXX