LA-UR 12-00592

Licensable Technologies

# nanoFOAM

**Applications:**

Nanofoams can improve the efficiencies of:

- Catalytic production of ammonia, sulfuric acid, fuels, plastics, sold shortening, and mane other chemicals and products
- Oil-refining processes
- Electrical generation from fuel cells that run on hydrocarbons
- Silver biocidal filters that destroy liquid- or airborne germs or bioweapons on contact
- Solid and liquid-monopropellant rocket fuels
- Targets for inertial-confinement-fusion experiments

**Nanofoams can also:**

- Improve the strength and heat-transfer properties of jet-turbine blades while decreasing their weight
- Reduce the emissions of nitrogen oxides from internal combustion engines and coal-fired power plants
- Remediate chlorohydrocarbons in the environment
- Enhance the sensitivity of biomedical detectors, and
- Serve as electron sources for plasma TVs and as radar absorbing materials

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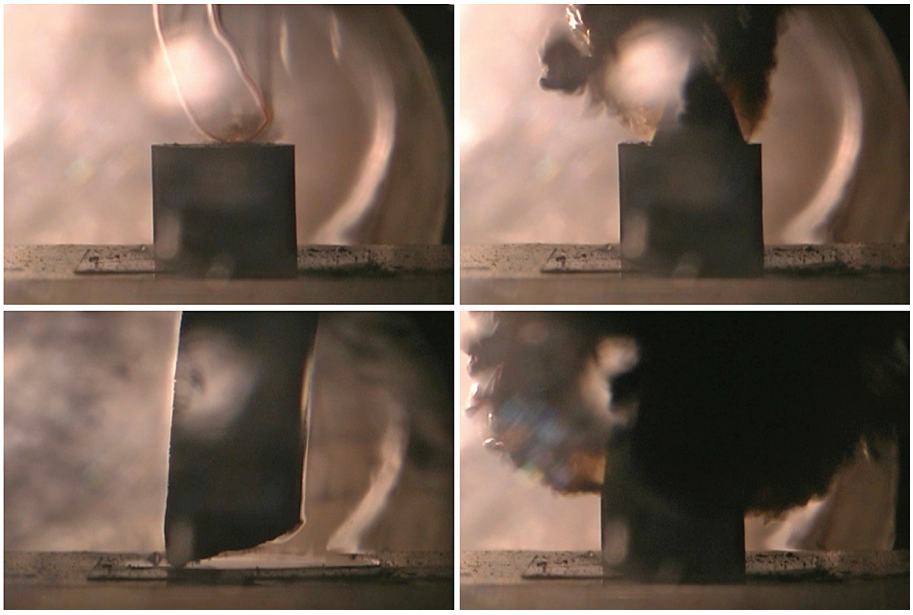

***In the upper left frame, the slanted U-shape with the bright spot is a resistively heated wire igniting a pellet pressed from one of our high-nitrogen transition-metal complexes. (The spot is a reflection from the window of the experimental chamber.) As the pellet rapidly burns, its volume dramatically increases as nitrogen gas released by the combustion creates nanoscopic pores in coalescing metal particles that are also released.***

**Summary:**

Los Alamos National Laboratory's (LANL) nanoFOAM technique produces self-supporting, nanoporous metal foams. They produce a nanofoam by igniting a pressed pellet of one of LANL's special compounds in an inert atmosphere. The compounds are high-nitrogen transition-metal complexes synthesized with a low-cost, high-volume method. To date, LANL has produced nanofoams of iron, cobalt, copper and silver. LANL expects to produce nanofoams of many of the more than 60 transition metals in the periodic table. The nanofoams have pore diameters of 20 nanometers to 1 micrometer, surface areas as high as 258 meters-squared per gram, and densities as low as 0.01 gram per cubic centimeter. These values compare favorably with those of silica aerogels, the lightest known solids.

**Development Stage:**

Technology Readiness Level: 4- Component prototypes tested in a controlled environment.

**Patent Status:**

| Title: | ID Number: | Patent/Appl. Number: | Date: |
|---|---|---|---|
| Preparation of Nanoporous Metal Foam from High Nitrogen Transition Metal Complexes | S-104,818 | US Patent No. 7,141,675 | 11/28/2006 |

**Licensing Status:**

Available for exclusive and collaborative agreements.

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