



## Flexible energetics: Improving safety, providing dependable localized energy

### **Technology marketing summary:**

Powdered composite energetic materials (made with a combination of a metal fuel plus an oxidizer) can be tailored for many applications; however, usually the powder form presents challenges. Although some methods of consolidating the powder exist, the resulting material is typically brittle, has very little structural strength and is often susceptible to electrostatic discharge.

Researchers at Idaho National Laboratory and Texas Tech University developed an innovative method for consoli-

dating powdered composite energetic materials that results in a flexible, waterproof, free-standing and easy-to-handle energetic material that consistently delivers required localized energy when ignited, and is inert to electrostatic discharge.

### **Technology description:**

Powdered composite energetic materials are mixed with a binder consisting of a two-part silicone material and a solvent such as hexane. The silicone binder also acts as a fuel, adding energy to the reaction upon ignition. The resulting product can be blade

cast, extruded, or placed in a mold until cured. Once the material is cured and solid, it can be further processed or used as is. A sheet of energetic material can be rolled, folded and easily cut with scissors.

In addition to the base composite material, carbon fiber fabric may be incorporated to improve the structural integrity of the flexible sheets.

Flexible energetic material can be used in many applications where powdered or brittle consolidated composite energetic materials would fail. The material burns at a predictable rate and is waterproof, making it an excellent

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The Energy of Innovation

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### For more information

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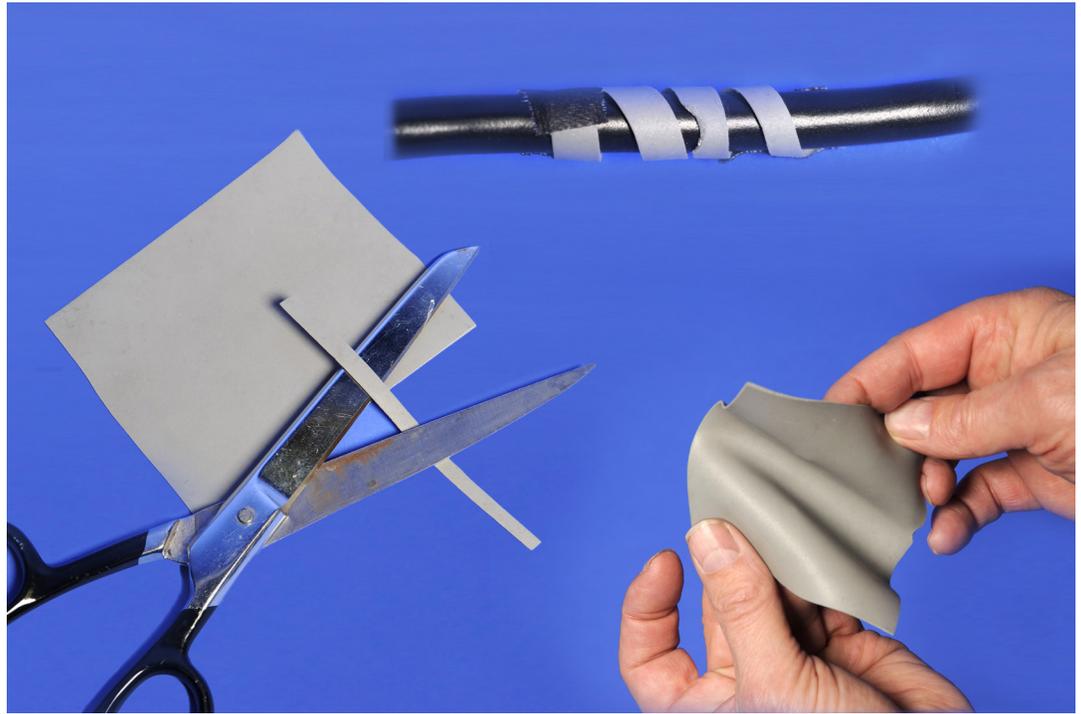


Figure 1: Flexible energetic sheet is easy to handle

A U.S. Department of Energy  
National Laboratory



safety fuse that works under water. A destructible seal/gasket made of flexible energetic material will remain securely in place until ignited and burned away. Flexible sheets, including carbon-reinforced sheets, could be incorporated into structural laminate material, or serve as a substrate for circuit boards in electronics or other applications where the ability to destroy the device may be desired.

#### Technology benefits:

- Flexible, moldable – can be formed to fit many applications
- Waterproof and burns under water
- Flexible energetic sheets can be used in structural applications to enable destruction on demand

#### Applications:

Military, police, mining, quarrying, oil and gas exploration