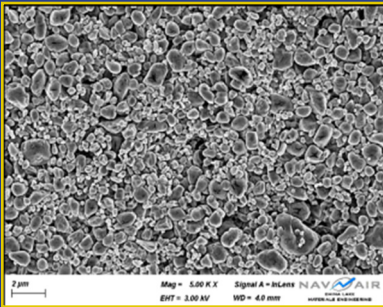


## Novel Initiating Explosive for Use in u-LEEFI



**PERIOD OF PERFORMANCE:**  
January 2021 to December 2024

**PLATFORM:**  
Energetics / Special Purpose Munitions  
Initiation System

**CENTER OF EXCELLENCE:**  
EMTC

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**STAKEHOLDER:**  
NSWC Crane Division

**TOTAL MANTECH INVESTMENT:**  
\$843,000

S2920 — Industrialization of Submicron Explosive for Ultra-Low Energy Initiator (u-LEEFI)

### Objective

The objectives of this Energetics Manufacturing Technology Center (EMTC) project are to demonstrate and qualify a novel initiating explosive for use in ultra-low energy exploding foil initiators and then demonstrate and qualify a novel ultra-low energy initiator. The warfighter needs lightweight, safe and reliable initiation systems. This technology is an enabler for future smart weapons when employed in multi-point configurations that facilitate directional, deformable and tailorable effects warheads, as well as inclusion in smaller smart munitions that may currently employ out-of-line devices and hot wire detonators. Future in-line safe initiation systems must consume less energy, volume, and weight. This state-of-the-art explosives technology can meet the requirement for smaller, less energy-intensive systems.

The low energy exploding foil initiator (LEEFI) is a qualified in-line initiator (ILI) permitted for use without interruption. Advancements in ILI technology are required to enable much smaller initiation systems with lower energy demands. This project will demonstrate ultra-low energy exploding foil initiator (u-LEEFI) technology enabled by the use of sub-micron CL-20 harvested from industrial grinds of CL-20.

### Payoff

Successful completion of this project will provide important benefits to the U.S. Navy in several areas, including improved cycle time, reduced cost, and improved reliability. In addition to the substantial reduction in process steps, handling, and material movement, it is highly probable this project will result in improved reliability by eliminating the current requirement for wetting and drying small particle size CL-20. Finely ground nitramines, including CL-20, typically agglomerate to some degree during drying. Eliminating the need for drying after shipment will result in a more consistent starting material for the mixing process.

The first programs that will receive this technology are unable to achieve reliable firing or consistent lot-to-lot performance using the current Low Energy Exploding Foil Initiators (u-LEEFI). The u-LEEFI technology leveraging this novel explosive is a multi-threaded enabler that allows increased firing margin, use of smaller and lower cost components, and reduced supply chain risks. At a minimum, it is expected to save ~\$2M over the next five years by enabling the use of less expensive components and also guaranteeing a consistent future supply of enhanced explosives that are produced using industrial processes that reduce manufacturing and production supply chain risks and lower cost due to fewer failed lots.

### Implementation

After successful demonstration of the reproducible benefits of using the novel explosive in a u-LEEFI, Naval Surface Warfare Center Crane Division will assess the performance of the parts produced in the EMTC project in the end application. The measures of performance include an acceptable reliability at tactical all fire based on both threshold testing and functional testing after exposure to tactically representative environments. If the device demonstrates reliable performance across those environments, the data will be compiled and submitted to the program manager for review and approval for immediate implementation into the production pipeline.

