

RAM Technology for Energetics Synthesis and Crystallization

S+2993 — CACR / CAC Manufacturing Technology Scale-Up

Objective

The objective of this Energetics Manufacturing Technology Center (EMTC) project is to provide a modular agile system for the synthesis and crystallization of energetic materials called the Continuous Acoustic Reactor / Continuous Acoustic Crystallizer (CACR / CAC). The design work will be predicated on the synthesis and crystallization of 2,6-diaminopyrazine-1-oxide (DAPO), a precursor to LLM-105 from N-nitrosodi (cyanomethyl) amine (IDAN-NO). The ultimate objectives are to design, build and install a system capable of producing a variety of energetic materials.

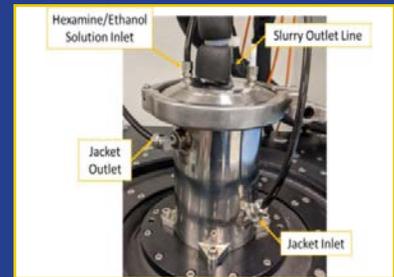
Payoff

Successful completion of this project will reduce preparation time by allowing for rapid re-configuration to produce a variety of materials. For example, the project will allow for the feed vessels to be reused for other raw materials. Also, the design will be such that taps and fittings are provided to add additional materials or to replace downstream components (for example, filters) with other equipment simply by disconnecting hoses and installing the new equipment. Similarly, the reactor product stream can be routed to a filter, a future liquid-liquid extraction, or the crystallizer module easily and quickly.

Multiple energetic materials may be synthesized and/or crystallized. The actual materials, apart from the designed bases DAPO and IDAN-NO, are yet to be determined. The CACR / CAC has the ability to process solid materials up to 200 microns in size in a liquid stream. This is a feature that is an improvement over alternatives such as an Advanced Flow Reactor (AFR). Solid precipitates form during energetics synthesis and plug the flow path of an AFR. Additionally, tunable crystallization allows control of particle size and distribution to desired parameters.

Implementation

Resodyn will design and build the prototype for the CACR / CAC as well as assist in installing the equipment at Naval Surface Warfare Center Indian Head Division (NSWC IHD). They will also provide initial start-up / operational verification of their equipment and train NSWC IHD personnel. Delivery and commissioning for both the CACR and CAC at NSWC IHD is targeted for completion in 3Q FY2026.



PERIOD OF PERFORMANCE:
October FY2022 to May FY2026

PLATFORMS:
Low sensitivity mortar propellant charges used by the U.S. Marine Corps
Potential replacement for TATB in Trident II nuclear warheads

CENTER OF EXCELLENCE:
Energetics Manufacturing
Technology Center (EMTC)

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