

Department of the Navy SBIR/STTR Transition Program

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Topic # N222-116
Tunable, Repeatable, Calcium Lanthanum Sulfide Ceramic Powder Development
TDA Research, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research

Transition Target: Any optical components in infrared-based applications for advanced remote sensing, guidance and communications, and multispectral imaging

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Other Transition Opportunities: Army and Air Force optical systems also employing Calcium Lanthanum Sulfide (CaLa2S4; CLS) optics; infrared sensors; support infrared lasers on medical equipment

Notes: TDA expects to make high purity CLS material with a high level of reproducibility and the method allows for tuning of the calcium and lanthanum stoichiometry. TDA, which currently has all the facilities needed to produce CLS powders, and currently produces 60+ tons of sorbents and other powders annually, will produce the powder and sell it to the Navy and third-party fabricators of CLS parts. Infrared CLS windows have potential applications in targeting and tracking systems.



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WHAT

Operational Need and Improvement: There is a critical need for a high purity commercial source of calcium lanthanum sulfide (CaLa2S4; CLS). Ceramics made from CLS have an unusually broad range of transmittance in the infrared (IR), as well as high mechanical strength and environmental durability. For these reasons, CLS is an ideal material for IR windows used in applications such as multiband optical components and multispectral imaging. CLS ceramics are not yet broadly used because the precursor powders are inconsistent, which leads to difficulty when fabricating optical-quality parts. The Navy is seeking new, controlled methods for reproducibly producing CLS powders of high quality for producing optical components.

Specifications Required: A new synthetic method for producing CLS powders must reproducibly result in pure powders with consistent properties from batch to batch. Further, the process must be versatile so that stoichiometry of the resulting powders can easily be tuned to match desired compositions in terms of calcium and lanthanum content. The powders must be compatible with consolidation techniques that will be used to produce fully dense optical components. Finally, the synthetic process must be scalable in order to meet the demands for the powder required to fabricate optical components.

Technology Developed: TDA is developing a new, efficient method to manufacture CLS powder that, if successful, will be less expensive than previous methods, better-suited for a large-scale manufacturing environment, and will produce consistently high purity, high quality material from batch to batch. The process is highly amenable to stoichiometry changes, easily producing CLS powders that range from 3:1 to 18:1 lanthanum:calcium ratios. Our new process has the potential to consistently make CLS in high purity from batch to batch. We have formed a partnership with a major producer of ceramic parts and will supply them with CLS powder for fabricating IR transparent parts for the Navy.

Warfighter Value: TDA's CLS powders have the potential to make it easier to form consolidated optical ceramics made from CLS. CLS optics have an unusually broad range of transmittance in the infrared (IR), as well as high mechanical strength and environmental durability, making them ideal for optical components in infrared-based applications for advanced remote sensing, guidance and communications, and multispectral imaging.

WHEN

Contract Number: N68335-24-C-0218

Ending on: May 15, 2026

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Deliver kilogram quantities to sponsor for evaluation	High	Laboratory production process	3	3rd QTR FY26
Begin Phase II Option work	Medium	Scaled-up production process achieved	4	3rd QTR FY27
Work with third-party optical manufacturer to process product	Medium	Fabrication of optical-quality parts	4	3rd QTR FY27
Begin Phase II.5 optimization and Navy qualification	Medium	Qualification of materials for use in parts	5	3rd QTR FY27
Phase II: TDA manufacture and supply to third party optical company and/or Navy	Low	Sales of product to Navy or manufacturer	6	1st QTR FY30

HOW

Projected Business Model: The product resulting from this technology will be a highly reproducible, high purity calcium lanthanum sulfide (CLS) powder. TDA is already developing semi-pilot scale methods for producing its CLS powder, and thus, TDA plans to manufacture the CLS powder and supply it to the Navy and third-party fabricators of CLS optics. TDA currently has all the facilities needed to produce CLS powders, and currently produces 60+ tons of sorbents and powders annually in these facilities.

Company Objectives: Since we intend to manufacture a CLS powder with a variable calcium/lanthanum composition, we can provide CLS powders to manufacturers with the capabilities to produce large scale CLS optical quality parts. Companies with CLS consolidation capabilities are looking for raw material providers with the capability of producing high purity CLS powders that can be made to their consolidation process specifications. If successful in developing its versatile manufacturing process, TDA can potentially meet the needs of these CLS optical part manufacturers, as well as provide powders of variable compositions for basic research.

Potential Commercial Applications: Our CLS powders potentially have applications in any optical systems that employs CLS optics. CLS is an ideal material for IR windows used in applications such as infrared remote sensing, guidance and communications, infrared lasers for medical devices, and multispectral imaging.

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