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TOPIC TITLE:
Polycrystalline
Laser-Host Material

**CONTRACT
NUMBER:**
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**SBIR
COMPANY
NAME:**
nGimat Co.
Atlanta, GA

**TECHNICAL
PROJECT
OFFICE:**
AFRL Materials
and Manufacturing
Directorate,
Wright-Patterson,
AFB, OH

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*A nanopowder technician at nGimat transfers precursor solution during development of Yttrium Aluminum Garnet powder.
(Courtesy Photo)*

MONEY-SAVING LASER WEAPONS CLOSER TO REALITY

The Air Force and a small business partner are making a big leap toward fielding aircraft-mounted laser weapons that will save millions of dollars for every shot fired at adversaries instead of conventional missiles. While laser-based systems have taken longer than expected to field – hampered in part by material issues – a nanopowder manufacturing technology under development by the Air Force and Atlanta, Georgia-based nGimat Co. is poised to make laser use a reality sooner than later.

SBIR/STTR SUPPORT

With \$750,000 from the Air Force Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program, nGimat plans to leverage other recent successes by pursuing transition of these materials into laser weapon systems and transparent missile domes that could be used by the Air Force.

For the Air Force Research Laboratory (AFRL), nGimat developed materials processes for Yttrium Aluminum Garnet, also known as YAG powder, the ingredient from which new laser amplifiers are made. In addition to providing near-instantaneous target engagement at a fraction of the cost – about a dollar per shot, compared to millions of dollars for a conventional missile – the technology provides for an extremely deep magazine since the laser’s batteries can be recharged during flight.

THE NEXT STEP

Now, nGimat and another contractor are jointly working to develop and manufacture the powders. This includes designing and testing a first-of-its-kind production system for the nanomaterials to reach consistent purity levels.

“The Department of Defense has worked hard to improve polycrystalline YAG for lasers, and this effort by nGimat is the natural next step,” said Dr. Ken Hopkins, the Air Force project engineer. “In addition, it will enable innovative laser designs being pursued by U.S. defense companies.”

BUILDING ON A TECHNICAL SUCCESS

The original SBIR effort by nGimat to develop powder for use in laser applications, administered by the Army, was considered a technical success.

In 2015, a major defense contractor expressed strong interest in nGimat’s YAG production capabilities. However, that would have required a more robust, scaled-up manufacturing process.

Unable to internally fund such a large development effort, and with the Army budget under constraints, nGimat approached the Air Force for help.

ATTRACTING OTHER FUNDING SOURCES

In addition to new funding for nGimat, the Air Force SBIR/STTR program leverages more than \$1.6 million in funding and resources from the Air Force Research Laboratory and other partners as well as from local and state incentives for hiring new employees. These funds will help ensure technologies developed under the SBIR Phase II effort successfully transition to military or private sector use.

With continued development, and the installation of dedicated production systems employing the proper controls and system feedbacks, officials expect that nGimat will achieve the proper certifications and manufacturing capabilities. The result will be reliability, purity and consistency, and product volumes to meet the DoD’s laser development needs.



U.S. AIR FORCE

AIR FORCE SBIR/STTR PROGRAM

AFRL/SB | 1864 4TH STREET | WRIGHT-PATTERSON AIR FORCE BASE | OHIO | 45433
COMM: 800-222-0336 | FAX: 937-255-2219 | INFO@AFSBIRSTTR.COM | WWW.AFSBIRSTTR.COM