Nitride Global Awarded AFWERX SBIR Phase I Contract to Advance Chip-Scale Quantum Navigation Sensors

Aluminum oxynitride-on-copper packaging platform targets deployable atom-interferometer sensing for GPS-denied navigation and passive subsurface detection



WICHITA, KS, UNITED STATES, September 14, 2026 / EINPresswire.com/ -- Nitride Global, Inc. (“NGI”), a domestic developer of aluminum oxynitride (AlON) advanced packaging thermal management and dielectric technology and aluminum nitride (AlN) ultra-wide bandgap semiconductor materials, announced today that it has been awarded a Small Business Innovation Research (SBIR) Phase I contract by AFWERX to support the Department of the Air Force (DAF). The award funds a feasibility study of a centimeter-scale microwave atom chip quantum sensor for precision navigation and remote sensing gravimetry.

Under the award, Nitride Global will evaluate an integrated Atom-Interferometer Microwave Atom Chip, designated A-MAC, built on the company’s transformative AlON platform. The effort addresses a critical capability gap for Airmen and Guardians: reliable positioning, navigation, and timing in environments where GPS is jammed, spoofed, or otherwise unavailable.

Addressing a Critical Navigation Gap
Inertial navigation systems accumulate error over time. Without a satellite fix to correct them, positional uncertainty grows continuously, limiting how far and how long a platform can operate independently in contested environments. Atom interferometers, which measure acceleration and rotation against the wavelength of a matter wave, are among the most stable inertial sensors yet demonstrated and the most promising path beyond that limit.

To date, however, such instruments have remained largely confined to the laboratory, with leading systems occupying a meter or more of bench space. Efforts to reduce their scale have encountered a packaging constraint rather than a limitation of the underlying physics: compact

microwave atom chips continue to depend on distributed radio-frequency hardware, and the resulting thermal load and phase drift degrade the measurement.

A Materials Approach to a Packaging Constraint

The A-MAC architecture consolidates that distributed microwave chain onto a single integrated board. NGI's AlON, a thin, conformal, high-isolation dielectric material, will enable co-locating microwave routing, coupling structures, and the trap geometry on one stack in which heat is conducted outward through metal rather than through a bulk ceramic substrate. The objective is a centimeter-scale architecture suitable for size, weight and power constrained platforms.

Research Partnership with William & Mary

The Phase I team pairs NGI's deposition and packaging capability with the atomic physics group of Dr. Seth Aubin, Associate Professor of Physics at William & Mary, joining the effort as a subcontractor and research partner. Dr. Aubin's laboratory has spent more than a decade developing the trapping physics that A-MAC is designed to package, including microwave atom chip traps, the microwave AC Zeeman force for ultracold atoms, and AC Zeeman potentials for atom interferometry, with support from the National Science Foundation.

In this phase, the teams will model thermal behavior, microwave insertion loss and coupling, and candidate trap geometries for the integrated architecture, concluding with a decision gate and a Phase II technical roadmap.

Transformative Potential Across Defense and Commercial Applications

For the Department of the Air Force and the broader defense community, the opportunity is to make advanced quantum sensing technology practical outside of the laboratory with applications in positioning, navigation, and timing that do not depend on satellites. This would enable hypersonic vehicles, unmanned aircraft, orbital systems, submerged platforms and autonomous ground vehicles, including UAV interceptors, to navigate accurately through extended GPS outages. The requirement is equally acute for UAV interceptors and effectors operating inside contested or deliberately self-jammed electromagnetic environments. For commercial users, the same class of technology could eventually support applications such as resource exploration, infrastructure monitoring, and subsurface mapping.

Engagement with Platform Integrators

User and transition discovery is the funded scope under this Phase I, and NGI is seeking engagement from aerospace and defense integrators to help define form factor, environmental envelope, and performance thresholds. The AlON-on-copper stack under evaluation for A-MAC is the same platform the company is industrializing for power modules, 2.5D/3D packaging, RF and optical systems, where it has demonstrated, for power electronics, up to a 47% reduction in thermal resistance relative to industry-standard materials and over 10X in advanced packaging. Integrators interested in defining transition requirements for compact quantum inertial sensing are invited to contact the company.

Leadership Perspective
“Quantum inertial sensing has been constrained for the same reason power electronics were constrained a decade ago: the limit is set by the package, not by the physics. If microwave routing and thermal management can be carried on the same material system, the instrument becomes small enough to fly. Dr. Aubin’s group has established the trapping physics; our contribution is a substrate capable of taking it out of the laboratory, and it is the same AlON-on-copper platform we are already industrializing for power and RF. We are grateful to AFWERX for supporting a capability the Department of the Air Force requires, and the commercial market has only begun to address.”
— Mahyar Khosravi, Chief Executive Officer, Nitride Global, Inc.

About Nitride Global, Inc.
Nitride Global, Inc., headquartered in Wichita, Kansas, develops aluminum oxynitride (AlON) advanced packaging and thermal management technology for power electronics, RF and 3D packaging, alongside ultra-wide bandgap aluminum nitride (AlN) substrates. One of only four companies worldwide with AlN crystal growth expertise, and the only remaining fully domestically owned one, the company’s mission is to deliver transformative dual-use innovation while advancing national security & leadership. For more information, visit www.nitrideglobal.com.

About AFWERX
As the DAF innovation arm and AFRL division, AFWERX connects small businesses with Airmen and Guardians to address key challenges, operating from Wright-Patterson Air Force Base to accelerate technology transition. For more details, visit afwerx.com.

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