

Small Ohio Company's Chemistry Breakthrough Could Have Major Defense Implications

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REalloys Inc. (ALOY), a North American rare earth metallization company, says it has successfully demonstrated a new process for producing rare earth fluorides without hydrofluoric acid—one of the most hazardous chemicals traditionally used in rare earth processing. Companies mentioned in this release include: REalloys Inc. (ALOY), [BHP Group Ltd.](#) (NYSE: BHP), Rio Tinto Group (NYSE: RIO), [NioCorp Developments Ltd.](#) (NYSE: NB), [IperionX Ltd.](#) (NASDAQ: IPX), Olin Corporation (NYSE: OLN).

It also comes amid a looming 2027 ban on Chinese-origin rare earth materials, as the U.S. and its allies work to rebuild rare earth processing capacity after decades of supply chain consolidation overseas.

Only a small number of companies in North America are attempting to rebuild those capabilities. REalloys is one of them.

From its metallization platform in Euclid, Ohio, the company converts rare earth oxides into finished metals and magnet alloys used by manufacturers supplying the defense industrial base and advanced industrial markets. The new fluorination technology expands that platform further upstream.

REalloys said independent laboratory testing confirmed that its HF-free process can produce metallization-grade rare earth fluoride feedstock with oxygen content of 0.34 weight percent—well below the 1 percent threshold typically required for rare earth metal production.

"Hydrofluoric acid has been necessary for rare earth metallization, until now," said Lipi Sternheim, chief executive officer of REalloys. "We believe this breakthrough can significantly reduce the environmental burden, safety risks, and costs traditionally associated with this critical step of rare earth processing while helping enable cleaner rare earth metal production in the United States."

Rare earth fluorides are the intermediate material used to produce metals such as dysprosium, terbium, and neodymium—elements that strengthen the high-performance permanent magnets used across modern defense systems, aerospace platforms, and advanced industrial technologies.

Scaled, this process could remove one of the most hazardous chemical steps from rare earth metal production while expanding the ability to manufacture these materials within North America.

Rebuilding The US Rare Earth Supply Chain-Cleaner

For years, the Western response to rare earth dependence focused on mining and separation. Mountain Pass restarted. New separation plants began appearing in North America. Oxides such as neodymium-praseodymium can now once again be produced domestically.

But oxides themselves don't power the civilian economy and the American defense industry: rare earth metal alloys do. That's the missing link in the chain that REalloys is now providing—and scaling.

That transformation—from oxide to metal—is the true industrial chokepoint. For decades, China has maintained a dominant position across nearly every stage of the rare earth supply chain.

Even when rare earth ore was mined in the United States and separated domestically, the metallurgical conversion that turns those oxides into usable metal was still performed overseas. The expertise, equipment, and operating experience migrated there over time.

Rebuilding that capability is far more complex than reopening a mine. Metallization requires tightly controlled reduction reactions, specialized high-temperature furnaces, and process control systems capable of maintaining stable yields and purity across multiple rare earth elements simultaneously. Very few facilities outside China have ever operated at a meaningful scale.

REalloys (ALOY) is attempting to rebuild that capability in North America. At its Euclid, Ohio platform, the company converts rare earth oxides into finished metals and magnet-grade alloys for manufacturers supplying the defense industrial base and advanced industrial sectors.

The newly demonstrated fluorination technology pushes that effort one step further upstream. By eliminating hydrofluoric acid from the fluorination stage, REalloys' process could remove one of the most hazardous chemical inputs historically required in rare earth metallurgy, according to the company. If scalable, it would allow the same industrial platform being expanded to rebuild Western rare earth metals capacity to operate with a materially lower environmental and safety burden. In other words, the effort to scale rare earth metallization outside China may not only restore supply-it may also produce a cleaner version of the industry as it returns.

Rare Earth Supply and Demand: A Shifting Landscape

For years, rare earth supply looked abundant because China flooded the market. That era is ending. Global demand for rare earth materials is expected to multiply in the coming decades as electrification, defense modernization and advanced manufacturing expand simultaneously. Many industry forecasts project demand doubling or tripling by the 2030s and rising several-fold again by mid-century.

At the same time, China now consumes the majority of the rare earths it produces. Roughly 60 percent of Chinese supply is absorbed domestically by electric vehicle manufacturing, wind turbines, robotics, consumer electronics, and advanced industrial production. As those industries grow, China's surplus available for export continues to shrink. Which means the world is entering a very different rare earth market than the one that existed a decade ago.

As demand rises and the surplus buffer of available supply contracts, Western manufacturers and governments have placed increasing focus on rebuilding domestic and allied supply chains for these materials.

When China previously restricted rare earth exports, the shock moved through supply chains almost immediately. Industrial users-from automotive manufacturers to electronics producers-found themselves scrambling for materials that had quietly become essential to modern manufacturing. And the exposure goes far beyond defense contractors.

Permanent magnet motors used in electric vehicles rely on rare earth elements to deliver the efficiency and performance required by next-generation EV platforms. At the same time, the rapid build-out of cloud and artificial intelligence infrastructure is driving demand for advanced cooling systems, robotics, and automation equipment that also rely on rare earth magnets.

Rare earth materials now underpin two of the fastest-growing industrial sectors on the planet: electrification and digital infrastructure. Yet the Western world built almost no strategic buffer for them. The 2027 deadline has added urgency to those efforts.

Beginning January 1, 2027, new U.S. defense procurement rules will prohibit Chinese-origin rare earth materials from entering the American defense supply chain-across every stage, from mining and refining to metallization and magnet production. Every defense contractor in the country will need a qualified, non-Chinese source of supply.

This explains why the small number of companies rebuilding rare earth metals capacity outside China suddenly matters far more than it did only a few years ago.

Other resource companies to keep an eye on:

BHP Group (BHP) has sharpened its portfolio focus around so-called "future-facing commodities," prioritizing copper and nickel as structural demand drivers while reducing legacy exposure to thermal coal and petroleum. Its attempted acquisition of Anglo American underscored management's willingness to pursue transformative scale in copper, even though the transaction did not ultimately proceed.

The company continues investing heavily in Escondida in Chile, the world's largest copper mine, extending mine life through concentrator upgrades and resource conversion. In the United States, BHP remains a joint venture partner with Rio Tinto on the Resolution Copper project in Arizona, a deposit that could materially increase domestic copper supply if permitted.

Rio Tinto Group (RIO) is broadening its portfolio beyond its historic reliance on iron ore by expanding into lithium and copper. The acquisition of Arcadium Lithium materially increased Rio's exposure to battery raw materials and diversified risk away from the politically complex Jadar project in Serbia.

At the same time, the underground ramp-up at Oyu Tolgoi in Mongolia is progressing toward steady-state production, with the asset expected to become one of the largest new sources of copper globally. In North America, Rio continues development work on Resolution Copper alongside BHP, though permitting timelines remain a key variable.

NioCorp Developments (NB) is the primary developer of the Elk Creek Project in southeast Nebraska, which is poised to become the most significant domestic source of Niobium, Scandium, and Titanium in North America. Following the launch of the White House and EXIM Bank's "Project Vault" initiative in February 2026, a strategic effort to build a U.S. Strategic Critical Minerals Reserve, NioCorp has moved into the national spotlight as a foundational security asset.

Operationally, the company has transitioned from exploration to active development, with its Board of Directors approving the official start of the Mine Portal Project in early 2026. This \$44.6 million initiative marks the beginning of physical construction at the site, supported by recent drill results that confirmed high-grade mineralization.

IperionX (IPX) is disrupting the global titanium industry by re-shoring production to the United States using its patented HAMR™ and HSPT technologies. Unlike the traditional, high-cost "Kroll process" utilized in China and Russia, IperionX's method allows for the production of low-carbon, high-performance titanium components using 100% recycled titanium scrap as feedstock.

The company has established partnerships with key customers in the defense and automotive industries, including a prototype purchase order from American Rheinmetall to produce lightweight titanium components. These titanium parts offer a 45% weight reduction over steel, improving performance across a range of vehicle and industrial applications. IperionX has received over \$47 million in funding from the U.S. Department of Defense and is currently expanding its Virginia facility to meet growing demand from government and commercial customers, including major automakers like Ford, who are seeking to lighten vehicle frames without compromising structural integrity.

Olin Corporation (OLN) serves as the "indispensable utility" for the entire Western critical minerals and rare earth processing industry. As the world's leading producer of chlor-alkali products, Olin provides the massive volumes of hydrochloric acid and caustic soda required to separate rare earth elements and purify lithium brine. In early 2026, Olin intensified its "Beyond250" structural cost-reduction program, targeting over \$120 million in annual savings to maintain its competitive edge as the primary chemical supplier to the "Battery Belt" refineries currently coming online across North America.

While Olin faces the typical headwinds of a cyclical commodity market, its 2026 strategy has pivoted toward

long-term, high-margin supply agreements with domestic mineral processors who require "just-in-time" chemical logistics. The company's sprawling infrastructure in the U.S., combined with its expansion into Brazil and Europe, allows it to act as the "picks and shovels" play for the energy transition.

By. James Stafford

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