

# Low-Cost Production of Titanium Alloys

**SRI's process will enable low-cost, energy-efficient production of titanium alloy granules.**

### Single-Step Production

Titanium (Ti) is a strong, light-weight, and corrosion-resistant metal increasingly used in lightweighting. Today, however, Ti metal and alloy production is energy-intensive and expensive.

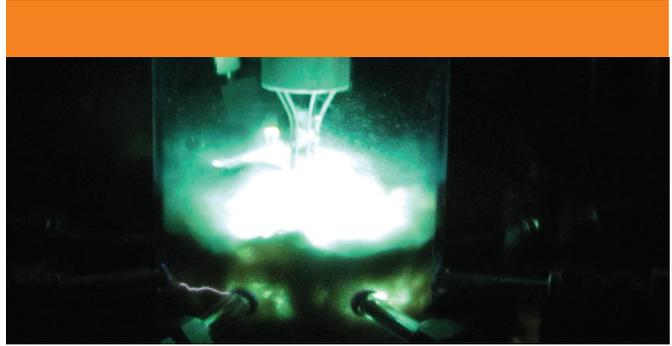
To overcome these challenges, SRI International is developing an advanced process that reacts Ti tetrachloride and other metal chlorides with hydrogen to produce Ti or Ti alloy granules in a single step.

### A New Approach

SRI's process is based on the simultaneous reduction of metal chlorides to produce Ti alloy granules in a single step using a multi-arc fluidized bed reactor (MAFBR) developed by SRI.

Powder metallurgy is not practical with titanium today because of the high cost of producing feedstock particulate material. Through direct granule production, costly, energy-intensive steps to produce sponge and ingot are eliminated, as well as the waste typically associated with machining metal parts.

With funding from ARPA-E's Modern Electro/Thermochemical Advances in Light-Metal Systems (METALS) Program, SRI built and tested a proof-of-concept system and conducted a techno-economic analysis.



Operating 4-inch multi-arc fluidized bed reactor

### Benefits

If successful, SRI's process will reduce the cost, energy consumption, and CO<sub>2</sub> emissions associated with Ti alloy production.

- *Energy security: Lightweight vehicles to improve fuel efficiency could reduce U.S. dependence on foreign fossil fuel resources used in the transportation industry.*
- *Environment: Simplifying the Ti production process by eliminating high-energy melting steps would reduce energy consumption and decrease CO<sub>2</sub> emissions.*
- *Low-cost Ti for lightweight vehicles: Producing Ti alloys at a cost similar to stainless steel could make lightweight vehicles a cost-competitive option for improving vehicle fuel efficiency. This could result in substantial overall fuel savings in the transportation sector.*
- *New Ti alloys: SRI's process could enable the production of alloys that cannot be produced with conventional technology, providing engineers with a larger portfolio of materials.*



Operating 2-inch titanium granule multi-arc fluidized bed reactor

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## SRI International

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