PURDUE INNOVATES | Office of Technology Commercialization

High-Concentration Aluminum Alloys for Improved Ignition and Combustion

Tailored Al alloys that boost ignition/combustion performance for energetic systems while reducing instability and corrosion risks.

Researchers at Purdue University have developed aluminum alloys with improved ignition and combustion properties for energetic materials applications. In the past, additives such as lithium or magnesium have been used at high mass fractions to achieve this at the expense of low temperature stability, molecular weight, and corrosive behavior (unintentional oxidation). Purdue's approach demonstrates that it is possible to use small mass fractions of metal additives to achieve combustion and ignition improvements while mitigating their detrimental effects. This technology could reduce/eliminate the need for protective coatings on energetic materials systems. This technology has applications in energetic materials, including propellants, explosives and pyrotechnics.

Technology Validation:

This technology is in the conceptual stages and has been validated based on theoretical specific impulse for additive alloys as well as thermogravimetric analysis curves of various aluminum alloys.

Advantages:

- Improved performance

- More desirable combustion and ignition behavior

- Mitigation of instabilities and corrosion (oxidation) associated with conventional alloys/metals

- Facile implementation of technology

Applications:

- Explosive, pyrotechnic, and propulsive systems

Technology ID

2024-SON-70382

Category

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Aerospace & Defense/Hypersonics & Propulsion Systems

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

Further information

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Intellectual Property:

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