

# 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

**TRL: 2**

## Technology ID

2024-SON-70382

## Category

Chemicals & Advanced  
Materials/Coatings, Adhesives &  
Sealants  
Aerospace & National  
Security/Hypersonics &  
Propulsion Systems  
Chemicals & Advanced  
Materials/Materials Processing &  
Manufacturing Technologies

## Authors

Caleb Nathaniel Harper  
Steven F Son

## Further information

Will Buchanan  
[wdbuchanan@prf.org](mailto:wdbuchanan@prf.org)

Jacob Brejcha  
[jjbrejcha@prf.org](mailto:jjbrejcha@prf.org)

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**Intellectual Property:**

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