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Optical Sensitizer for Low-Energy Laser Ignition of Propellants

A photosensitive additive enables low-energy, reliable laser ignition for rockets and defense.

Researchers at Purdue University have developed a new optical sensitizer for low-energy laser ignition of propellants. Traditional ignition techniques such as hot-wire bridges and pyrotechnic charges can cause accidental sparking and ignitions. Purdue researchers have integrated a photosensitive component to optically sensitize propellants making them capable of energetic ignition under a laser. The flash band energy is found to be 5-8 J-cm^2 on average and in the presence of a neodymium-doped yttrium aluminum garnet (Nd:YAG) laser of wavelength 1064 nm and 532 nm respectively were found to be as low as 0.6 J-cm^2. This new method can be implemented in igniter applications including for rocket engines, motor vehicles, and military and defense.

Technology Validation: The flash band energy of the new optical sensitizers when optically ignited under a Nd:YAG laser of wavelength 1064 nm and 532 nm respectively was found to be as low as 0.6 J-cm^2.

Advantages:

-Sustained Ignition

-Low Energy Ignition

-Optical Energy in Reaction

Potential Applications:

-Ignition

-Laser-Induced Ignition

-Propellants

-Rocket Engines

Technology ID

2021-SON-69351

Category

Buildings, Infrastructure, & Construction/Structural Health Monitoring

Aerospace & Defense/Defense Electronics & Surveillance Technologies

Aerospace & Defense/Hypersonics & Propulsion Systems

Further information

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View online

-Motor Vehicles

-Military and Defense

TRL: 2

Intellectual Property:

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CON-Gov. Funding, 2023-12-01, United States

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