

## Optical Sensitizer for Low-Energy Laser Ignition of Propellants

**Track Code:** 2021-SON-69351

**Categories:**

- Chemical Engineering
- Chemistry and Chemical Analysis

**Keywords:**

- Chemical Analysis
- Chemical Engineering
- chemical reaction
- Chemical Reaction Pathway
- Chemistry and Chemical Analysis
- Ignition System
- Lasers
- Nanomaterials
- Nanophotonics
- Nanoscale
- Optical Elements
- Photosensitizer
- Photosensitizers
- Polymers
- Propellant
- Propellants
- Rocket Propellant

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<sup>2</sup> 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<sup>2</sup>. 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<sup>2</sup>.

**Advantages:**

- Sustained Ignition
- Low Energy Ignition
- Optical Energy in Reaction

**Potential Applications:**

- Ignition
- Laser-Induced Ignition
- Propellants
- Rocket Engines
- Motor Vehicles
- Military and Defense

**People:**

- Son, Steven Forrest (Project leader)
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- Gomez, Mateo
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**Intellectual Property:**

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**Country of Filing:** United States

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