Nanoparticles and Nanostructures for use as Optical Limiters
Technology #13760

Applications

This invention is related to optical limiters that could be used to protect photosensitive objects (which could be human eyes as well as sensitive optical equipment) from intense light generated by lasers.

Problem Addressed

There is a need to protect photosensitive objects from laser exposure. Current ways of addressing this include using dark sunglasses, optical filters and organic optical limiters. While using organic optical limiters is better than other methods, the organic molecules are often environmentally unstable or can be damaged at high intensities.

Technology

The invention is an optical limiter device comprised of nanoparticles of a metallic material, including free electrons that undergo collective oscillations when exposed to the incident light. The nanoparticles could be of metallic materials such as gold and silver, and of variable shape and concentration. The device has a structurally rigid transparent medium in which a number of nanoparticles of the metallic material are embedded; and a mechanical support mounting the transparent medium between the incident light and an object. When the device is exposed to incident light above the threshold intensity, the electric field of the nanoparticles becomes enhanced. This enables the absorption of the incident light above the threshold limit while incident light with intensities below the threshold limit passes through.

Advantages

- It can withstand high laser irradiation without becoming opaque
- Environmentally stable and can be used more than once

Categories For This Invention:

Lincoln Laboratory
Photonics
Other (Photonics)

Intellectual Property:

Optical limiting using plasmonically enhancing nanoparticles
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8,345,364
Optical limiting using plasmonically enhancing nanoparticles
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**Publications:**

*Nonlinear Bleaching, Absorption, and Scattering Of 532-nm-Irradiated Plasmonic Nanoparticles*
Journal of Applied Physics
2013

*Optical Limiting with Complex Plasmonic Nanoparticles*
Journal of Optics
28 May 2010

**External Links:**
Lincoln Laboratory
http://www.ll.mit.edu/

**Image Gallery:**

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