



WINNER

2001 R&D 100 Awards Winner

Tandem-Configured Solid-State Optical Limiter

Features

Imagine that you are aboard an aircraft and that the pilot has just been hit with a laser beam. Although the beam lasts for a tiny fraction of a second, its intensity destroys the pilot's eyesight.

Now imagine a device that looks like a simple colored lens (with an ambient light transmittance at 65%) but can reduce by 400-fold intense beams of light from devices such as lasers. Known as optical limiters, these devices consist of a metallo-phthalocyanine dye embedded onto a polymer matrix. Made from solid materials, optical limiters can be designed in many colors or shapes, from the special windows designed for aircraft, armored personnel carriers, and tanks to the night-vision helmets worn by soldiers across the globe.

Applications

Because an optical limiter is a type of film, it can be retrofitted into many existing optical systems, such as

- laser goggles and night-vision goggles,
- binoculars,
- special sensor protectors, and
- video cameras.

Benefits

For the limiter to work, it must be placed in a focal plane so that there is sufficient energy density to activate it.

- Protects the human eye or other sensors from the damage caused by intense light.
- Sustains a maximum energy of 10 millijoules.
- Absorbs light beams as focused as 2×10^{-6} square centimeters.
- Consists of solid materials that are robust and long lasting.