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Radiation-Absorbing Materials and Surfaces Based on Metamaterials with Hyperbolic Dispersion

A novel, potentially inexpensive technology dramatically reduces radiation reflectivity through enhanced light scattering into hyperbolic metamaterials, offering a broadband, non-magnetic solution for applications like stealth and optoelectronics.

Existing methods to reduce reflected radiation are often substantially degraded by damage to the surface due to such things as exposure to the environment. This results in surface defects, including moisture adherence, which may lead to backscattered or reflected radiation. When used in stealth technology to disguise a vehicle or structure from radar, such defects may lead to its detection.

Researchers at Purdue University have developed a technology that allows dramatic reduction of radiation reflectivity due to the enhanced scattering of light into metamaterials with hyperbolic dispersion. This enhancement is caused by the broadband singularity of the density of states in such hyperbolic metamaterials. This novel technology does not rely on resonance (broadband), is potentially inexpensive to manufacture in any quantities, and does not require magnetic response.

Advantages:

-Reduces radiation reflectivity

-Does not rely on resonance nor requires magnetic response

Potential Applications:

-Stealth industry

-Military

-Optoelectronics

TRL: 4

Technology ID
65586

Category
Aerospace & Defense/Defense Electronics & Surveillance Technologies
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
Materials Science & Nanotechnology/Advanced Functional Materials

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Intellectual Property:

Provisional-Patent, 2010-05-18, United States | Utility Patent, 2011-05-18, United States

Keywords: radiation reflectivity reduction, enhanced scattering, hyperbolic dispersion, metamaterials, hyperbolic metamaterials, broadband singularity, density of states, stealth technology, optoelectronics, military applications, Electrical Engineering, Materials and Manufacturing, Metamaterials, Micro & Nanoelectronics