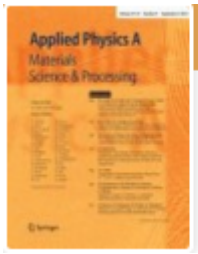
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Retroreflection of light from nanoporous InP: correlation with high absorption

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Abstract

Pronounced retroreflection behavior is reported for a fishnet nanoporous strongly absorbing semiconductor material. Retroreflection appears along with diffusive specular reflection for all angles of incidence for light wavelength corresponding to interband optical transitions, where absorption coefficient is of the order of 105 cm−1 (green and red light). Retroreflection is apparent by the naked eye with daylight illumination and exhibits no selectivity with respect to wavelength and polarization of incident light featuring minor depolarization of retroreflected light. Retroreflection vanishes for wavelength corresponding to optical transparency range where photon energy is lower than the InP bandgap (1.064 μm). The phenomenon can be classified neither as coherent backscattering nor as Anderson localization of light. The primary model includes light scattering from strongly absorptive and refractive super-wavelength clusters existing within the porous fishnet structure. We found that retroreflection vanishes for wavelength where absorption becomes negligible.