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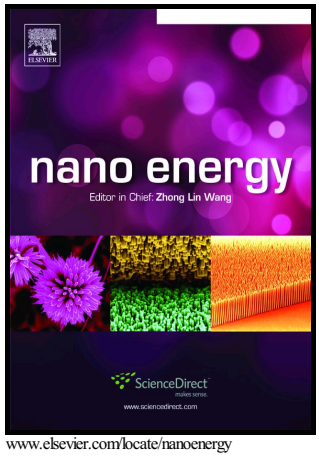

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Tunable Full-Spectrum Photo-thermal Conversion Features of Magnetic-Plasmonic Fe_3O_4/TiN Nanofluid

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Abstract

The concept of Janus nanoparticle stimulates plenty of efforts to taking advantage of optical characteristics of different materials. In this paper, we design and prepare the photonic nanofluids composed of Janus type of magnetic-plasmonic Fe_3O_4/TiN nanoparticles. Instead of the limited absorption property of single material, by making use of both the localized surface plasmon resonance of TiN in visible wavelength and the high absorption of Fe_3O_4 in near-infrared wavelength, the prepared nanofluid can realize the full-spectrum absorption of incident solar energy. In addition, since Fe_3O_4 has magnetism and the distribution of magnetic nanomaterials in fluid can be controlled with an external magnetic field, the as-prepared nanofluids have tunable optical and thermal properties. This work provides a new strategy to utilize the full-spectrum solar energy and control the photo-thermal performance of nanofluids.

Keywords: Janus nanoparticle; photonic nanofluid; magnetism; plasmonic; full-spectrum absorption; photo-thermal conversion