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Enhancement of light absorption in a WS_2 monolayer using spacer and Ag plasmonic layers

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Abstract

Among 2D nanomaterials, WS_2 monolayers with a direct bandgap and sharp absorption at 619 nm have opened a new horizon for the use of these materials in photonics and electropopics. In this paper, in order to increase the absorption, the role of Ag thin film as a plasmonic layer on the substrate and also, the effect of spacer and cover layers are theoretically investigated. The optical properties of the designed structures are investigated by the transfer matrix method in the visible wavelength region. In the structure consisting of a WS_2 monolayer with Ag and spacer layers, the absorption at 619 nm was increased to 57%. Sharp optical absorption as high as 40% for a large range of incidence angles in both polarizations was retained, giving a good perspective on the realization of WS_2 applications.

Keywords: absorption, plasmonic, spacer, cover, WS2 monolayer

For full article, refer to the Persian section