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Study of the optical absorption of metallic surfaces coated with a VO2 thin layer AHMAD KHAYYAT JAFARI, Texas Tech University, MATHEW GADDY TEAM, SERGEY NIKISHIN TEAM, LUIS GRAVE DE PERALTA TEAM, AYRTON BERNUSSI TEAM — Optical coatings are key components in modern optoelectronic devices such as smart windows. One of the materials which have recently found some applications as a uniform or patterned layer in optical devices is vanadium dioxide (VO_2). The optical properties of VO_2 change when it undergoes phase transformation from an insulating to a metallic phase near 68 ^{0}C. This phase transformation is accompanied by a crystalline structural change from monoclinic to tetragonal provides a unique opportunity for designing photonic devices with tunable optical properties which can be employed as a passive radiative cooling coating. In all these applications, the effect of the VO_2 coating layer thickness on the absorption spectrum is of great significance which has been not explored in any detail. In this work, we numerically investigated the absorption of a single thin VO_2 layer on different metallic films over a wide range of wavelengths at normal and oblique incident angles. We found that in the insulating phase, the air/VO_2/metal structure can be considered as an asymmetric Fabry-Perot resonant cavity which resonant absorption wavelength depends on both the VO_2 layer thickness and the type of metallic layer. In the metallic phase, there is always a narrow wavelength region with zero reflection which is independent of the of the metallic layer.

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