TRANSMISSION RESONANCE RESPONSE OF NI FILMS WITH ARRAYS OF SUBWAVELENGTH HOLES TO TIO_2 NANOCOATINGS

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Nanocoatings of TiO_2 (15-105 nm in thickness) were applied to one side of freestanding Ni films with microarrays of subwavelength holes exhibiting extraordinary transmission effects in the infrared. Shifts in the positions of the transmission resonances at perpendicular incidence have been characterized vs. coating thickness. Second order equations have been developed using analogies from the theory of angle-tuned attenuated total reflection experiments on metal coated prisms. These equations allow calculation of effective dielectric properties and TiO_2 film thickness from simple FTIR measurements