Contribution ID : **119**

Type : **Poster**

Broadband epsilon-near-zero and epsilon-near-pole 1D nanograting metamaterials in near-infrared regime

Light absorbers have drawn significant attention in a wide variety of research areas, including photovoltaics, sensors, photodetectors, and thermoelectrics. Although various plasmonic and photonic nanostructure configurations have been adopted to demonstrate the light absorption enhancement, a bandwidth of such light absorbers is typically narrow, thus limiting their potential for many applications. In this study, we demonstrate a broadband near-infrared metamaterial absorber, where indium tin oxide (ITO) is selectively deposited on a patterned silicon substrate at a subwavelength scale, based on a combination of epsilon-near-zero (ENZ) and epsilon-near-pole (ENP) resonances. The ENZ resonance that depends primarily on a material is at ENZ wavelength of 1290 nm, while the ENP resonance, which is easily tuned by altering a fill factor of a metamaterial structure, is created at a longer wavelength regime to achieve light absorption over a wide wavelength range from about 1620 to 2100 nm. Optical properties of the ITO 1D metamaterial absorber structures are investigated theoretically by using effective medium approximations (EMAs) and numerically by employing the finite-difference time-domain (FDTD) method, which present good agreement with experimental results. The strategy described in this paper may provide design principles and guidelines for diverse photonic and optoelectronic devices with broadband absorption characteristics, thereby opening up many potential applications.

Primary author(s) : KIM, Tae Young (Inha University); Mr KIM, Minsuk (Inha University); KIM, Wonyoung (Inha University); Prof. LEE, Kyu-Tae (Inha University); Prof. LEE, Minbaek (Inha University); Prof. JUN, Young-Chul (UNIST); Prof. HWANGBO, Chang Kwon (Inha University)

Presenter(s) : KIM, Tae Young (Inha University)

Session Classification : Poster Session B

Track Classification : Thin Film