Surface plasmons on phase-changed oxides

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ABSTRACT

Surface plasmons on functional oxides have received interest for near- and mid-infrared (IR) plasmonic applications. Recently, plasmonic studies have focused on the static and dynamic control of free carriers in oxides for smart window technology in order to shield solar energy. Our research has been advanced from two points of views. One is focused on semiconducting oxides such as In_2O_3 and ZnO with *s-p* band structures. It was found that plasmonic functionalities on these oxide semiconductors were benefits for solar-thermal shielding in the IR range [1], which are developed to functional oxides such as vanadium dioxide (VO_2) with a metal-insulator (*M-I*) transition as second viewpoints. The *M-I* transition in VO_2 can be easily switched the band strcutures by applying external fields. The phase-changed VO_2 are very interesting and promising aspects of active plasmonic materials [2]. However, basic plasmonic properties of VO_2 are still unclear at the present time. In an effort to apply for window applications, it is required to elucidate plasmonic mechanism in VO_2. In this presentation, we mainly report surface plasmons on phase-changed oxides, and discuss plasmonic properties of VO_2 using 2D nanosquare array structures. In particular, we focus on relationship between plasmonic responses and domain strcutures during the *M-I* transition, which dominates phase switching between metal and insulator states.

References:

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