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Surface Plasmon Resonance and Insulator-Metal Transition in Gold and Vanadium Dioxide Bilayer Films MELISSA BEEBE, LEI WANG, SCOTT E. MADARAS, J. MICHAEL KLOPF, ZHAOZHU LI, DAVID BRANTLEY, MATTHEW HEIMBURGER, College of William & Mary, RUSSELL A. WINCHESKI, JIWEI LU, STUART A. WOLF, University of Virginia, R.A. LUKASZEW, College of William & Mary — Under certain conditions, thin films of noble metals such as gold and silver exhibit intense surface plasmon polaritons (SPP), in what is called surface plasmon resonance (SPR). These are charge oscillations along the air/film interface resulting from the interactions between an illuminating wave and the free electrons at the conductor's surface. There are many possible applications of the SPR, including new plasmonic optoelectronic devices, biological sensors, and new imaging methods [1,2]. We now present correlated experimental studies and simulations on the modulation of the SPP in Au/VO_2 bilayers by the metal insulator transition (MIT) of VO_2, opening up new possible applications. The modification of the SPP wave vector by the thermally-induced MIT in VO_2 was investigated by measuring the optical reflectivity of the sample when SPP's were excited via gratings patterned on the Au surface and also in Kretchmann configuration in Au/VO_2 bilayers.

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[2] Huang, X. H.; El-Sayed, I. H.; Qian, W.; El-Sayed, M. A. J. Am. Chem. Soc. 2006, 128 (6), 2115–2120.

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