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Simultaneous Bulk and Surface Plasmon Resonance and Radiative Polaritons excited in RuO_2 films grown on glass and on TiO_2 (001)[1] L. WANG, C. CLAVERO, K. YANG, E. RADUE, College of William and Mary, G. SCAREL, James Madison University, I. NOVIKOVA, R. LUKASZEW, College of William and Mary — Conducting oxides, such as RuO_2, have a much lower carrier concentration as compared to metals, leading to a lower plasma frequency of $3.3eV$ which lies in the infrared (IR) region. This unique feature of conducting oxides allows for simultaneous observation of surface and bulk polariton modes in the IR range. Here we have investigated bulk and surface plasmons as well as radiative polaritons in RuO_2 thin films. The RuO_2 thin films investigated were grown using DC magnetron sputtering on glass and on TiO_2 (001). We have used X-ray Diffraction and Reflection High-Energy Electron Diffraction to characterize the microstructure of these samples. Four-point probe and ellipsometry were used to investigate the electrical conductivity and the optical properties. The optical measurements were carried out using HeNe red laser ($632nm$) and IR laser ($1520nm$) radiations to illuminate RuO_2 thin films. We will show that bulk plasmons can be excited in RuO_2 thin films in the visible red region, while simultaneous bulk plasmons as well as surface plasmons excitation are observed in the IR region. We also studied the substrate influence on the radiative polaritons in the middle IR region (20-2.2um) by measuring films grown on glass and on TiO_2 (001).

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