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Enhancement of the magneto-optical activity in thin films via surface Plasmon resonance excitation KAIDA YANG, CESAR CLAVERO, JONATHAN SKUZA, ROSA A. LUKASZEW, College of William and Mary — Light can be localized and manipulated in appropriately designed metallic and metallo-dielectric nanoparticle arrays and/or thin film structures. In particular, interesting phenomena occur near the plasmon frequency where optical extinction is resonantly enhanced and at the plasma frequency where the real part of the dielectric function changes sign. This phenomenon is very sensitive to slight changes in the dielectric constant at the surface and therefore Surface Plasmon resonance has been successfully applied to bio-sensing. One interesting possibility is the use of magnetic fields to influence the propagation of surface plasmon polaritons (SPP) and therefore mixing magnetic and plasmonic materials, seems a promising approach for obtaining externally controlled and/or modulated systems. We have found that remarkable enhancement of the magneto-optical activity can be achieved in Au-Co-Au trilayers when the surface Plasmon resonance is excited. Our studies also indicated that the effect is very sensitive to the thickness of the intervening layers. We have now investigated Au-Co nano-composite films that were deposited on glass substrates at different temperatures and with controlled varied composition. We have found that in this case the concentration ratio between Au and Co can be optimized for highest magneto-optical enhancement.

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