

Abstract Submitted
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Magnetic contrast tuning with nonlinear magneto-plasmonics¹

WEI ZHENG, Department of Applied Science, College of William and Mary, AUBREY T. HANBICKI, BEREND T. JONKER, Naval Research Laboratory, GUNTER LUPKE, Department of Applied Science, College of William and Mary — Magneto-plasmonics describes systems where plasmonic and ferromagnetic properties coexist. The nonlinear-optical magnetic second-harmonic generation (MSHG) technique is extremely sensitive to subtle modifications of the spin-polarized electronic structure of transition metal surfaces, the same region where surface plasmons (SP) are present. This technique, which builds a direct link between plasmonics and the magneto-optical effect, is called nonlinear magneto-plasmonics. We will present results of experiments that show that not only can the MSHG signal be enhanced by SPs in an attenuated total reflection (ATR) condition, but also that the magnetic contrast can be tuned by the angle-of-incidence. Furthermore, the magnetic contrasts of transverse and longitudinal MSHG display opposite trends. The tuning effect originates from the change of relative phase between magnetic and non-magnetic MSHG components. This new effect enhances the sensing of magnetic switching which has potential usage in quaternary magnetic storage systems and bio-chemical sensors due to its very high surface sensitivity.

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