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Nanocluster effects on magneto-resistance and optical second-harmonic generation in Au-Co composite films KAIDA YANG, Department of Applied Science, College of William and Mary, TATIANA MURZINA, Quantum Electronics division, Department of Physics, Moscow State University, ALE LUKASZEW, Department of Physics, College of William and Mary — Magnetic nanomaterials typically exhibit significant differences in their magnetic and magnetic-optical properties compared to bulk. A viable nanoscale platform to investigate the magnetic and magneto-optical properties of magnetic nanomaterials is in composite thin films to have magnetic clusters embedded on a different matrix material which size can be tailored. The Au-Co binary system is a typical phase-separation system in bulk phase diagram . The nanocomposite geometry allows tailoring the actual composition and microstructure of the composite by exploiting different temperature during deposition. In our previous studies, Au/Co/Au trilayers as well as Au-Co nanocomposite thin films exhibit strong enhancement of the magneto-optical activities due to surface plasmon polariton excitation in the noble metal. In this study, we investigate other non-linear optical properties such as second harmonic generation (SHG) in Au-Co nanocomposite thin films and understand its correlation with the magneto-transport properties of the composite. Optical SHG is a sensitive probe of surface and buried interfaces due to inversion symmetry breaking at the interfaces of centrosymmetric materials which allows probing of the structural and morphological properties near interfaces.

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