Magneto-optic properties and optical parameter of thin MnCo films

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Abstract
Having precise hysteresis loop of thin ferroelectric and ferromagnetic layers for optical switching and optical storages are important. A hysteresis loop can be achieved from a phenomenon call the magneto-optic effect. The magneto-optic effect is the rotation of a linear polarized electromagnetic wave propagated through a ferromagnetic medium. When light is transmitted through a layer of magnetic material the result is called the Faraday effect and in the reflection mode Kerr effect. In the present work we prepared a thin layer of MnₓCo₃₋ₓO₄ (0 ≤ x ≤ 1) and a binary form of MnO/Co₃O₄ by the spray pyrolysis method. The films have been characterized by a special setup of magneto-optic hysteresis loop plotter containing a polarized He-Ne laser beam and a special electronic circuit. Faraday rotation were measured for these films by hysteresis loop plotter and their optical properties were also obtained by spatial software designed for this purpose according to Swane Poel theoretical method. The measurements show that the samples at diluted Mn study has are ferromagnetic and the magneto-optic rotation show a good enhance respect to the single Co layers. Also, the study has shown that the MnCo oxide layer have two different energy gaps and by increasing of Mn this energy decreases and fall to 0.13 eV.

Keywords: magneto-optic, Faraday effect, Kerr effect and magneto-optic hysteresis loop

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