

Title: Optical and magneto-optical spectroscopy of materials with antiferromagnetic interaction

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Abstract: One of the goals of spintronic research is the efficient external control of magnetic moment. Non-collinear antiferromagnets in the antiperovskite structure, such as Mn_3NiN , show a piezomagnetic effect that can be used to utilize these materials in applications. In the strain free state, the material exhibit zero net magnetic moment.

Using strain induced by a lattice constant mismatch between the thin layer and a substrate on which the thin film is applied on a non-zero net magnetic moment can be registered.

Magneto-optical Kerr effect spectroscopy is used to investigate the non-collinear magnetic thin films. The effect of two substrate layers with resulting opposite sign of strain influencing the magnetic ordering of the antiperovskite material is studied with respect to sample temperature. Results show comparable spectral dependence with opposite sign of the Kerr effect caused by the opposite direction of net magnetization moments.

Ellipsometry measurements depending on sample orientation are performed to study the material anisotropy and its change during the magnetic phase transition for the thin film of Mn_3GaN . Spectroscopy of optical parameters and their anisotropy are investigated at different temperatures, below and above the Néel temperature.

Keywords: MOKE, antiferromagnet, ellipsometry, spintronics