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Influence of substrate effects in magnetic and transport properties of magnesium ferrite thin films

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Abstract

In order to study substrate influence in Mg ferrite properties, thin films were simultaneously grown by DC magnetron sputtering on different substrates (MgO (100) and SrTiO₃ (100)). In both cases samples show high values of saturation magnetization and Curie temperatures above room temperature. While in the case of the sample grown on MgO the hysteresis loops indicate the existence of more than one ferrimagnetic component and lower value of remanence to saturation ratio, the deposited one on SrTiO₃ is mono-component and has a rectangular-shape magnetic loop at all temperatures below 300 K. The difference is attributed to different microstructures due to the misfit strain caused by the different lattice constants between substrates and ferrite. The electric transport and photoconductivity properties have been investigated on both samples. Thin film growth on STO presents an increase around 40% of the photoconductance in the near UV range. The photocurrent shows two clear onsets that coincide with the indirect and direct band gaps of STO indicating the important role of this substrate in the generation of photo carriers.

Keywords: MgFe₂O₄, thin films, magnetism, photoconductivity, transport

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