

## Magnetization of manganite thin films on ferroelectric substrates

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Properties of thin films differ from properties of bulk materials. Magnetic properties of thin films depend on the stress near the substrates, roughness of the surface. We studied the influence of substrate ferroelectric properties on the magnetic properties of multiferroic thin films.

Here we investigate the magnetic properties of manganite  $\text{RMnO}_3$  ( $R=\text{Gd}, \text{Yb}, \text{Y}$ ) thin films of different thickness: 40, 60, 100, 120, 150 and 250 nm and the effect of epitaxial strain on these. The manganite thin films were deposited on dielectric  $\text{LaAlO}_3$  and ferroelectric  $\text{SrTiO}_3$  and  $\text{LiNbO}_3$  substrates.

We found that the type of substrate can impact to the magnetic phase transition temperature as it was for  $\text{GdMnO}_3$  thin films (Figure 1 a, b). We observed the presence of the ferromagnetically correlated regions in 250 nm thin film  $\text{YbMnO}_3/\text{LaAlO}_3$  (Figure 2b), and absent that in 150 nm thin film (Figure 2a).

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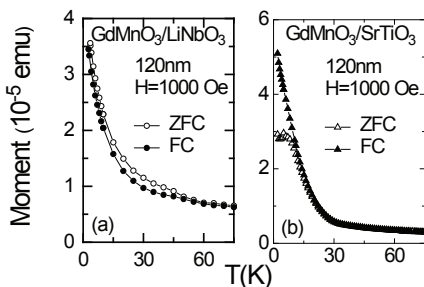


Figure 1. Temperature dependence of the magnetic moment in (a) -  $\text{GdMnO}_3/\text{LiNbO}_3$  and (b) -  $\text{GdMnO}_3/\text{SrTiO}_3$ .

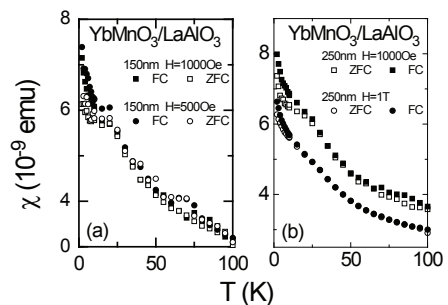


Figure 2. Temperature dependence of the magnetic susceptibility in  $\text{YbMnO}_3/\text{LaAlO}_3$  of the thickness (a) - 150nm and (b) - 250nm.