Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supplementary Information

Coupling of magnetic orders in a 4*f* metal/oxide system

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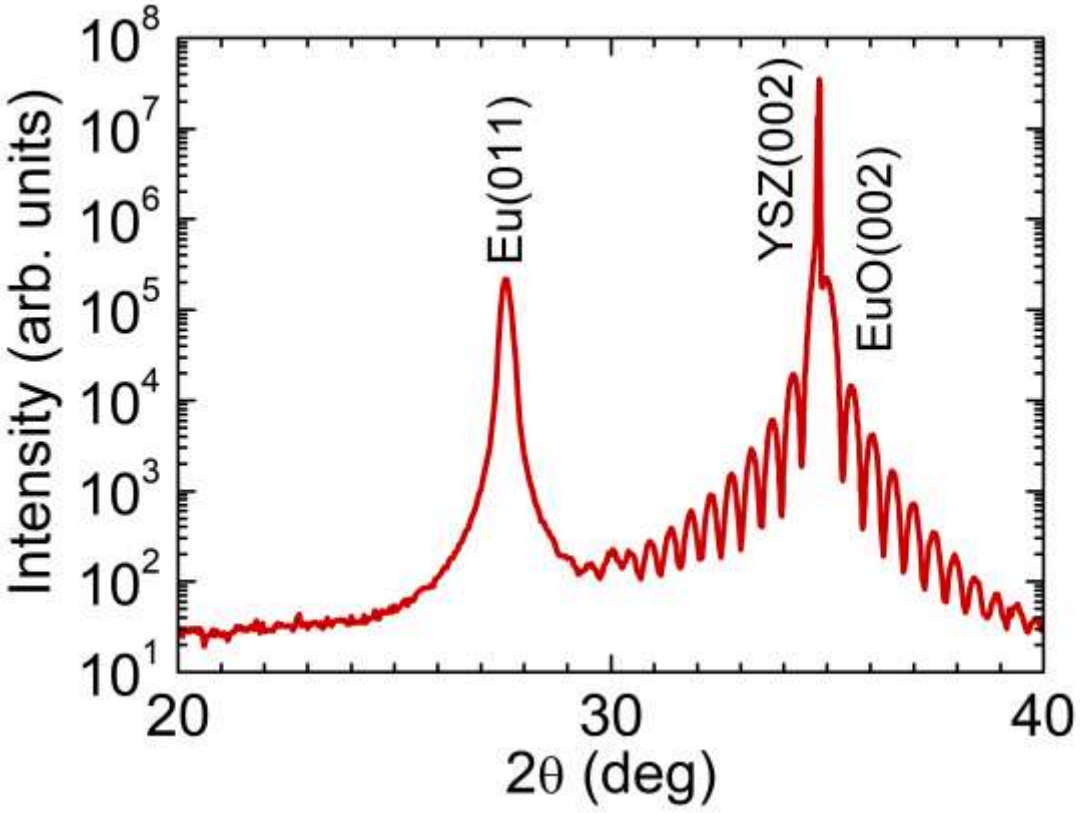

Fig. S1. A magnified region from 20° to 40° of the θ-2θ XRD scan of the SiO_x/Eu(60nm)/EuO/YSZ(001) film showing well-developed thickness fringes of the EuO layer.

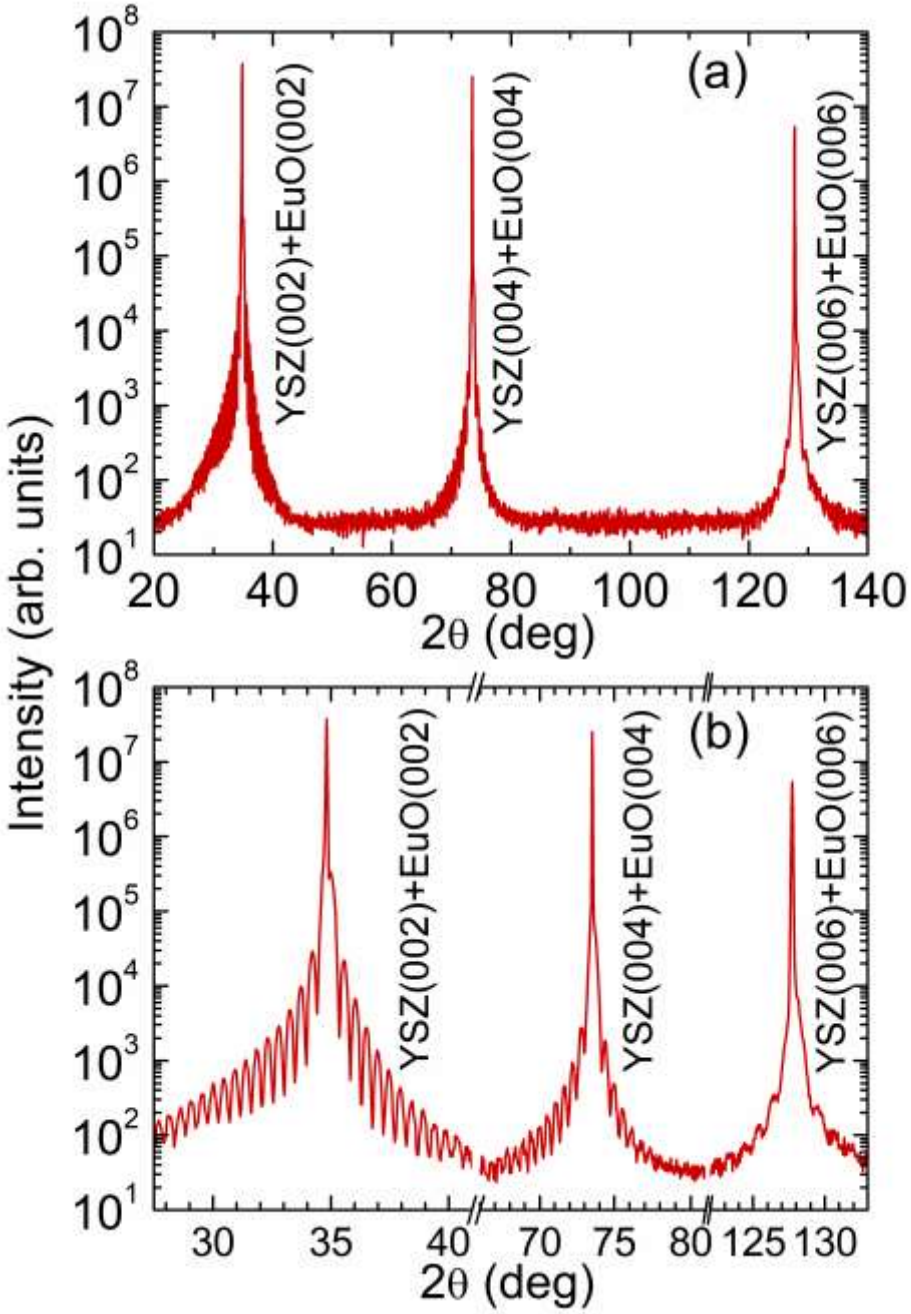

Fig. S2. (a) θ-2θ XRD scan of the SiO_x/EuO/YSZ(001) film; (b) magnified images around peaks EuO (002), (004) and (006) showing thickness fringes.

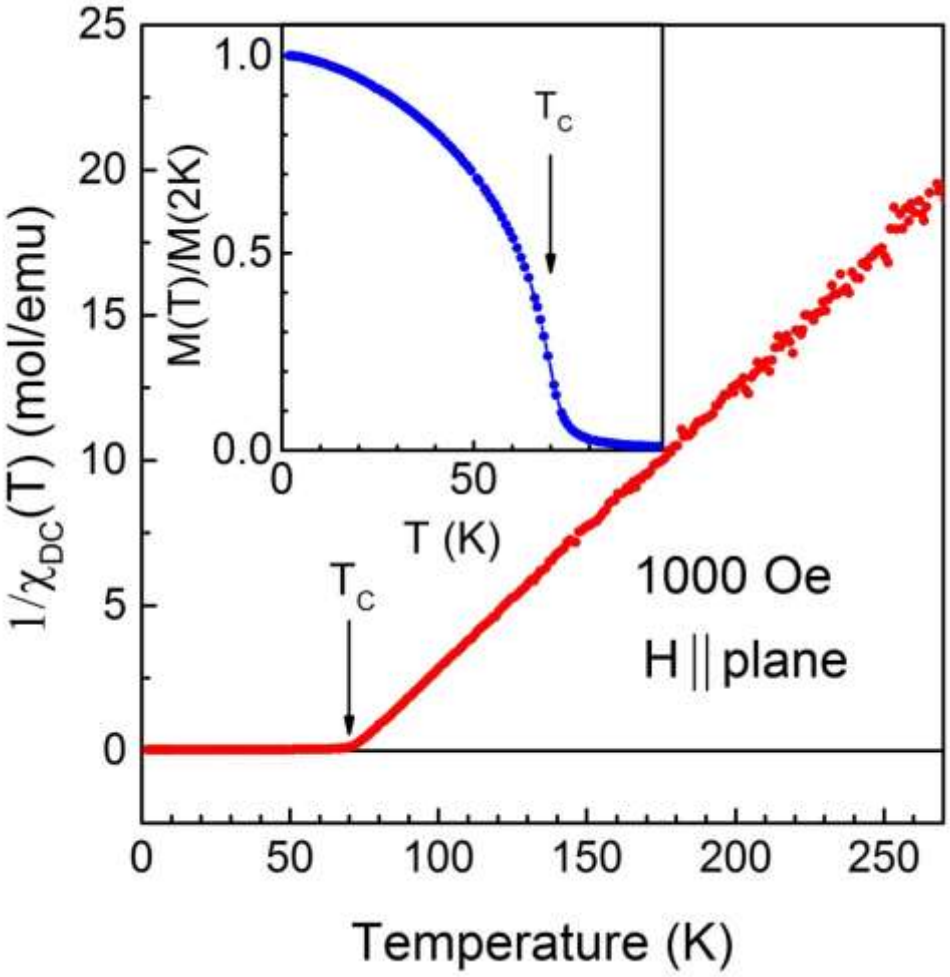

Fig. S3. Temperature dependence of the inverse of the DC susceptibility of the SiO_x/EuO/YSZ(001) film in an in-plane (along the [100] axis of YSZ) magnetic field of 1000 Oe allowing for determination of the Curie temperature of EuO ($T_C \approx 70\ K$). Inset: temperature dependence of the normalized magnetic moment of the same film.

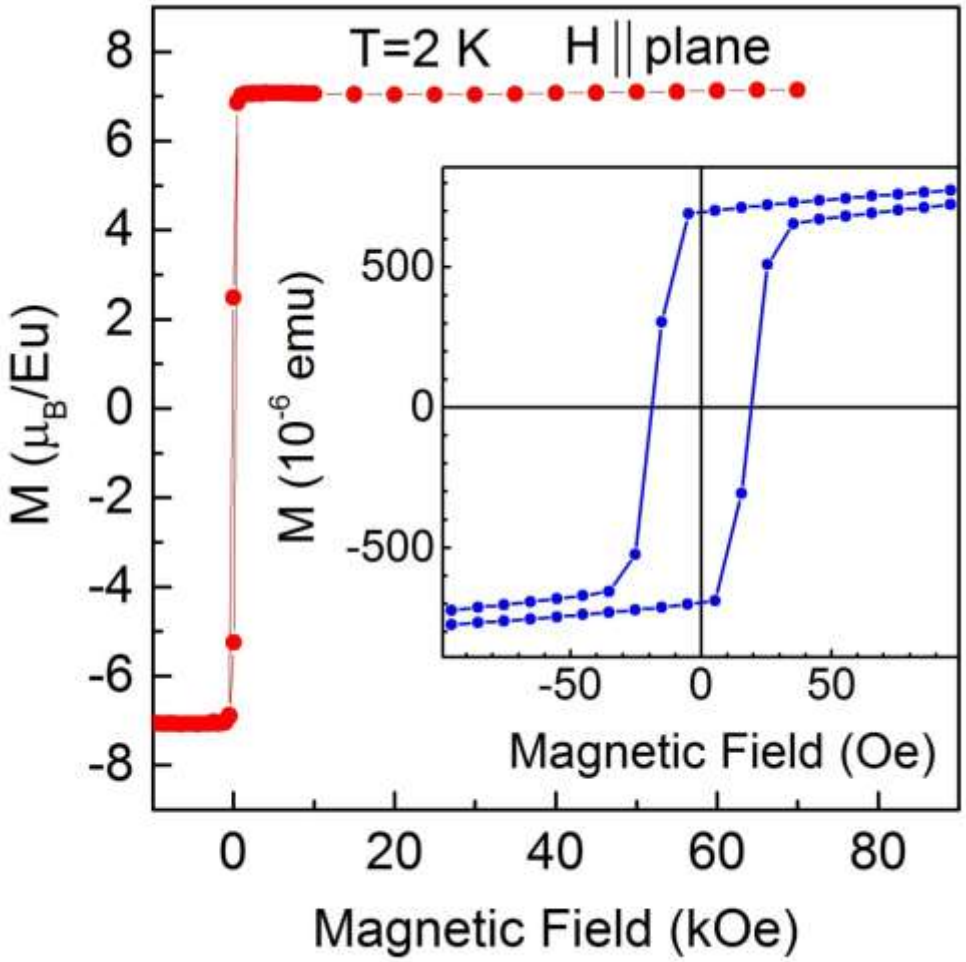

Fig. S4. Magnetic field dependence of the magnetic moment of the SiO_x/EuO/YSZ(001) film at 2 K. Inset: low-field part of the same dependence demonstrating that the hysteresis loop is centred at zero magnetic field. The magnetic field is directed along the [100] axis of YSZ.

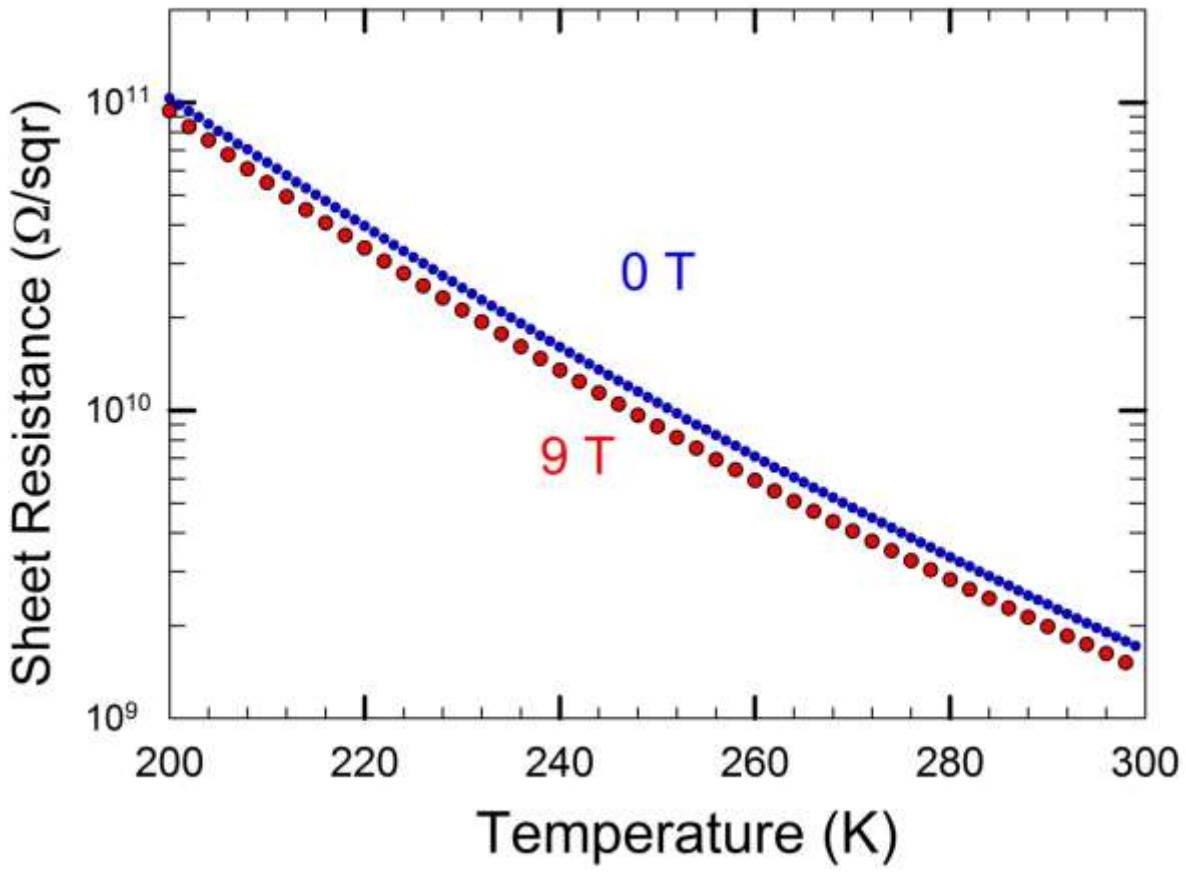

Fig. S5. Sheet resistance of the SiO_x/EuO/YSZ(001) film in zero magnetic field (blue) and in a magnetic field of 9 T normal to the surface of the film (red). At low temperature (below 200 K), the resistance is too high to be reliably measured.

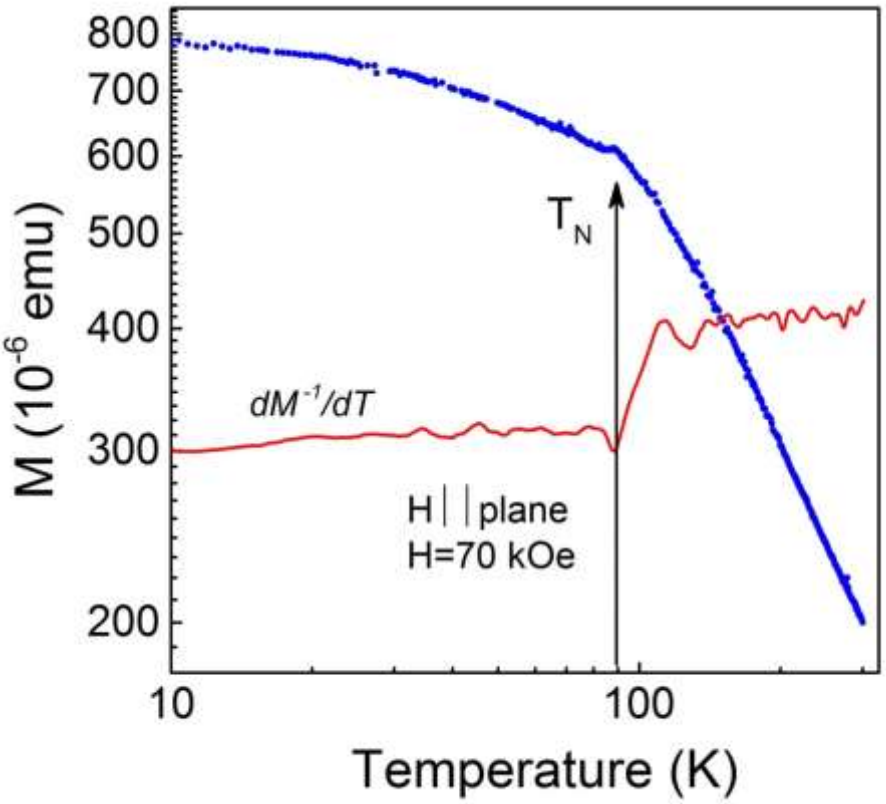

Fig. S6. Temperature dependence of the magnetic moment (blue) of the SiO_x/Eu/YSZ(001) film in an in-plane (along the [100] axis of YSZ) magnetic field of 70 kOe demonstrating a feature at the Néel temperature of Eu ($T_N \approx 90$ K). The red curve shows the temperature derivative dM^{-1}/dT.

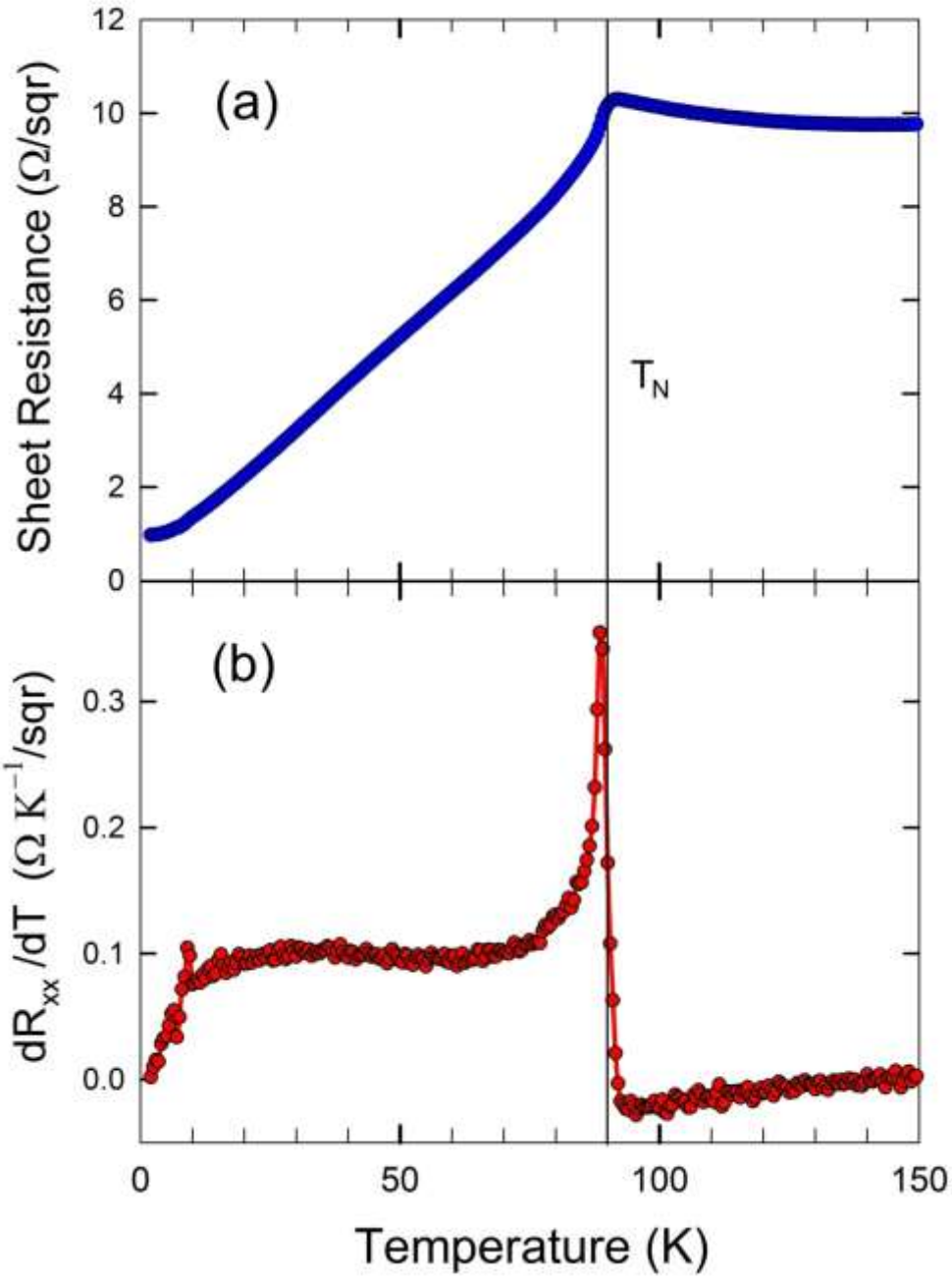

Fig. S7. (a) Temperature dependence of sheet resistance of the SiO_x/Eu/YSZ(001) film; (b) its temperature derivative. The vertical line indicates the Néel temperature of europium ($T_N \approx 90$ K).

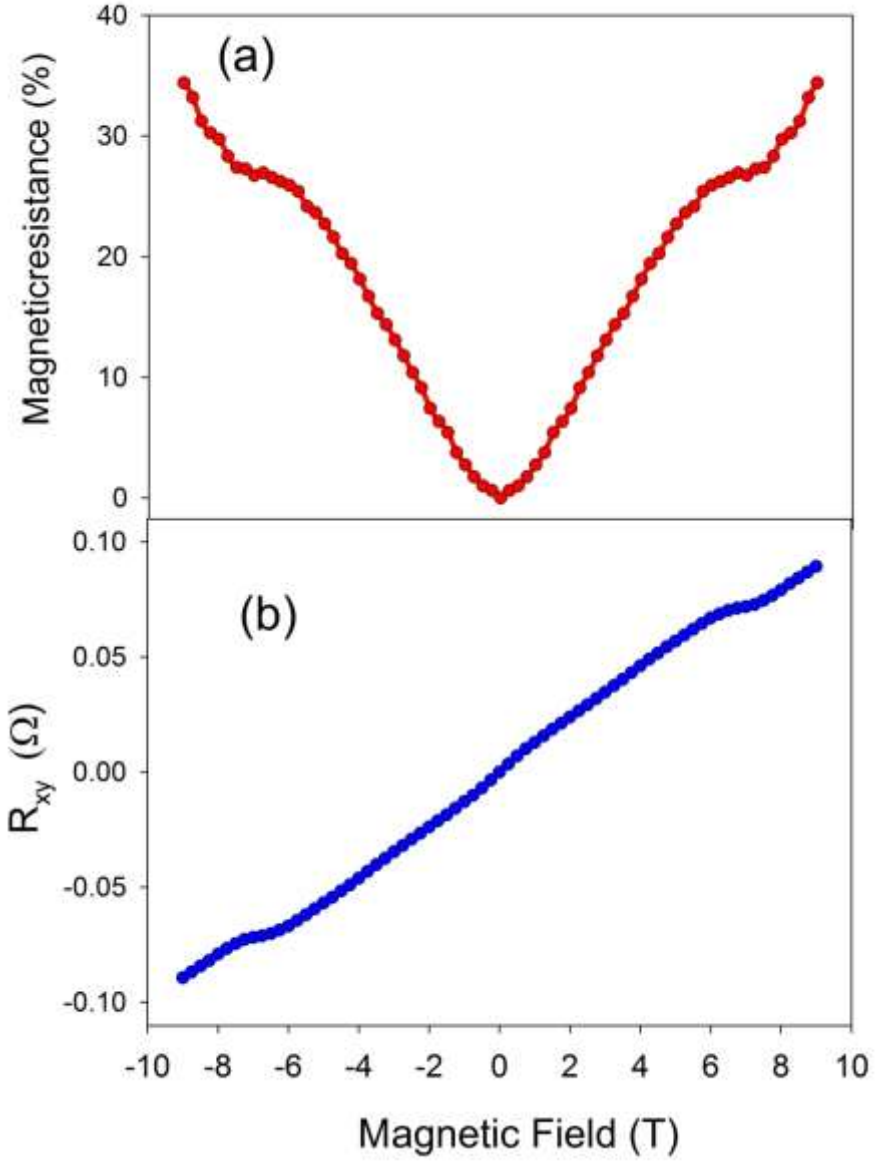

Fig. S8. Magnetic field dependence of (a) magnetoresistance (magnetic field is normal to the film surface) and (b) the Hall resistance of the SiO_x/Eu/YSZ(001) film.