c) In discontinuous film, the maximum of the MR is found in the measurement at 170K and MR(30T)≈90%. Similar value is obtained in continuous film at 250K.

d) The continuous film nor the discontinuous do not display a clear saturation of the MR at high fields

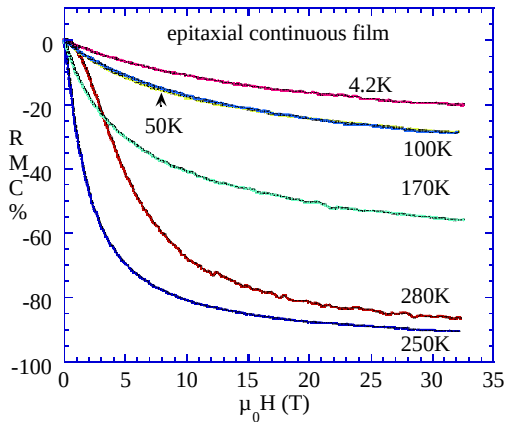

Fig. 3-26 *CMR at different temperatures for the epitaxial continuous film*

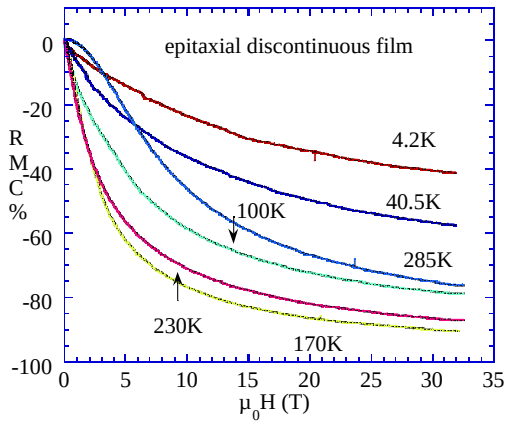

Fig. 3-27 *CMR at different temperatures for the epitaxial discontinuous film*

3.2.1.3 High Field magnetotransport on granular films

Granular films consisting in polycrystalline LCMO films on MgO(001) were obtained by the deposition at high ($T_{substrate}$=830°C) (HT) and low substrate temperature (LT). The deposition temperature being used to tune the grain size as explained in section 3.1.2.

Magnetoresistance measures performed at high fields in LT polycrystalline films permit to observe the clear absence of saturation of the MR up to fields of 32T at any temperature below T_C. For LT polycrystalline films, the LFMR appears as an abrupt change of slope in the magnetoresistance curve for fields below 1T as seen in the inset of Fig. 3-28 that is a characteristic feature of the granular behaviour.

In Fig. 3-30 and Fig. 3-31 are shown the CMR curves at 50 and 250K for the different films (polycrystalline (PC) at high (HT) and low (LT) deposition temperature and epitaxial films (EP) either in the continuous (C) or discontinuous (DC)).

The film LT-PC having the smallest grain size and thus the highest number of interfaces exhibits the highest curvature, while the epitaxial continuous film exhibits the lowest curvature.

At T_C the continuous epitaxial film displays the largest MR at the highest applied magnetic field (90%), nevertheless, the values of the CMR obtained for the other films at the highest applied magnetic fields are very close to this value which is not the case in the 50K measurements.

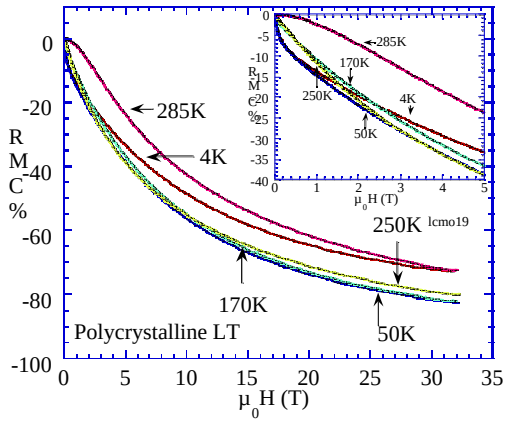

Fig. 3-28 *CMR for a 60nm polycrystalline LT deposited LCMO film on MgO.*

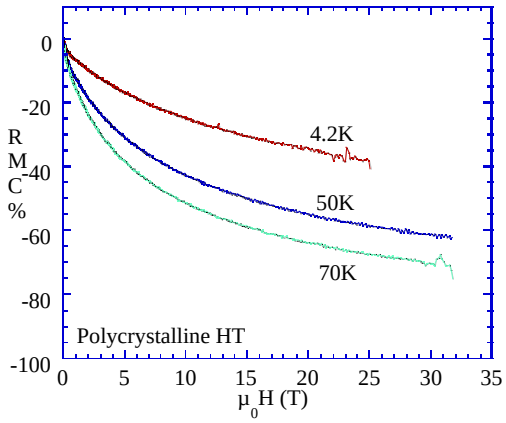

Fig. 3-29 *CMR for a 60nm polycrystalline HT deposited LCMO film on MgO.*

The above measurements suggest that in systems with a lot of crystallographic GB, the MR do not saturate even under the application of very high magnetic fields.

The MR below T_C has been found to be related to the existence of crystallographically non well-oriented grains. The proof is found in the comparison between the epitaxial and continuous film and the scratched film. The epitaxial film is constituted by crystallographically rather well-oriented (1.5° rocking curve in the film plane) grains while the epitaxial discontinuous film has additional misoriented grains at the scratched zone. This localised zone of disorder dominates the electrical behaviour of the film and is enough to induce about twice the MR of the epitaxial film at low temperature.

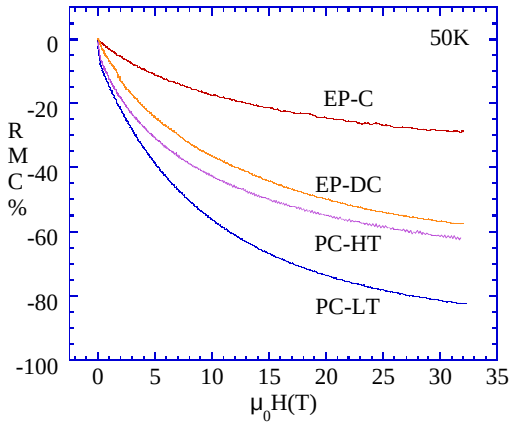

Fig. 3-30 *Comparison for different epitaxial and granular LCMO film on MgO of the High field slope at 50K which in the range between 15-32T tends to be the same.*

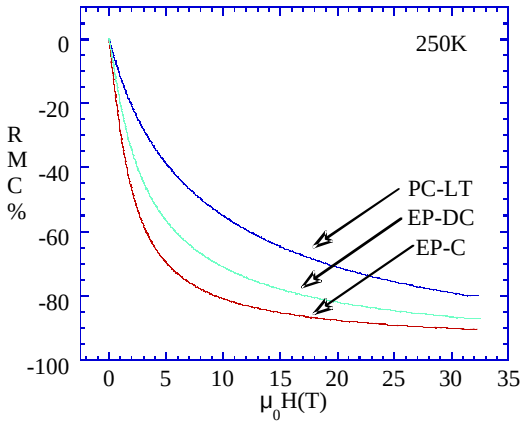

Fig. 3-31 *Comparison for different epitaxial and granular LCMO film on MgO of the High field slope at 250K.*