

Experiments on triclinic Mn_{12} -acetate mixed with a superconductor: enhanced tunneling, narrow zero-field resonance and Landau-Zener effect

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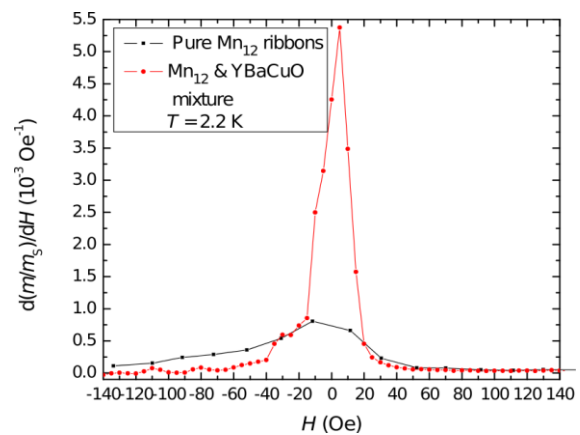
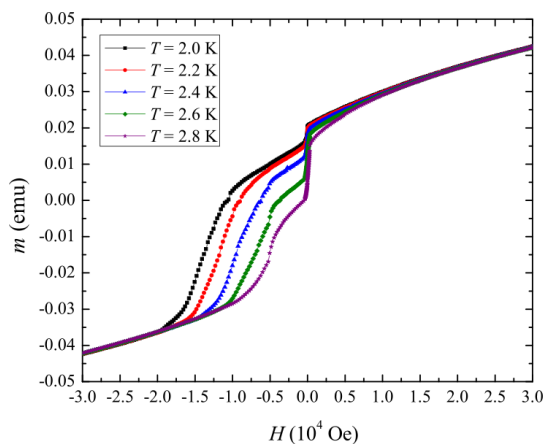
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We report [1,2] characterization and magnetic studies of pure triclinic Mn_{12} -acetate ribbons and mixtures of micrometer-size ribbons of Mn_{12} -acetate and micrometer-size particles of YBaCuO superconductor. An extremely narrow zero-field spin-tunneling resonance was observed in both systems, pointing to the absence of the inhomogeneous dipolar broadening. A pronounced magnetic relaxation was measured in the vicinity of zero field and the width of the zero-field resonance reduced to values as low as 50 Oe. By analyzing the tunneling rate from experiments performed by field sweeping near zero field we have been able to get a clear quantitative proof of the Landau-Zener dynamics of the tunneling magnetization. The experimental data for the pure ribbons can be explained by considering that the strong dipolar broadening in the zero-field resonance observed in the conventional tetragonal Mn_{12} -acetate is practically suppressed in the triclinic structure, due to the fact that the magnetic moments of the molecules do not form chains. On the other hand, the effect in the mixtures was attributed to the screening of the internal magnetic fields in the magnetic particles by Meissner currents flowing between superconducting grains surrounding the particles [3].

[1] J. Tejada, R. Zarzuela, A. García-Santiago, I. Imaz, J. Espin, D. Maspoch, E. M. Chudnovsky, *J. Supercond. Nov. Magn.* **29** (2016) 1133.

[2] I. Imaz, J. Espin, D. Maspoch, J. Tejada, R. Zarzuela, N. Statuto, E. M. Chudnovsky, arXiv: 1510.08894 (2015).

[3] E. M. Chudnovsky, J. R. Friedman, *Phys. Rev. Lett.* **85** (2000) 5206.



Left. Descending branches of magnetization curves of Mn_{12} ribbons at different temperatures.

Right. Field derivative of the magnetization curve of Mn_{12} ribbons and their mixture with YBaCuO.