ANGULAR DEPENDENCE OF SINGLE NICKEL NANOWIRE MAGNETORESISTANCE EVIDENCED BY UNIFORM MAGNETISATION REVERSAL

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9.7 cm

Using electrochemical deposition, 6 μm long nanowires of Ni are grown in commercial porous membranes. Typical pores' diameters are of the order of 80 nm with a density of $6 \cdot 10^8$ cm^{-2}. Regarding to the wide diameter's distribution in the template, a new contact growth technique has been developed to reduce this density and allow the anisotropic magnetoresistance of a single wire to be measured. The full magnetoresistive hysteresis loop is studied as a function of the angle ω between the applied field and the wire's direction. For each curve, the unique jump, corresponding to the field at which the magnetisation reverses, reveals that a single wire is measured. Considering a coherent rotation of the magnetisation with field, the reversible part of these magnetoresistive loops can be well described by the relation : $R = R_{\perp} + \Delta R \, cos^2 \Omega$ where Ω represents the angle between the current (along the wire's direction) and the magnetisation. Deviations to this law are observed before the irreversible jump and more pronounced at low angle ω. Moreover the angular dependence of the switching field can be described by a Curling mode behaviour suggesting these deviations and the coherent rotation of the magnetisation in the reversible part of the magnetoresistive loops.

13.4 cm

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