

Electrodeposition of cobalt based ferro-magnetic metal nanowires in polycarbonate films with cylindrical nanochannels fabricated by heavy-ion-track etching

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Polycarbonate films of thickness 30 μm were irradiated with heavy ions by applying a flux of 10^8 ions cm^{-2} to produce straight tracks perpendicular to the film surface. The tracks were preferentially etched in 6 M aqueous solution of sodium hydroxide to prepare cylindrical nanochannels. The channel diameters were tuned between 200 and 600 nm by varying the etching time. $\text{Co}_{81}\text{Cu}_{19}$ alloy nanowires were electrodeposited potentiostatically, while Co/Cu multilayered nanowires, consisting of alternating Co and Cu layers with thickness 10 nm, were synthesized by means of a pulse plating technique in channels of length 30 μm and diameter 200 nm. $\text{Co}_{81}\text{Cu}_{19}$ alloy nanowires showed an anisotropic magnetoresistance effect of 0.6%, and the giant magnetoresistance of Co/Cu multilayered nanowires reached up to 8.0%.