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研究论文

单晶Ni纳米线阵列的制备与磁性能

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摘要 采用恒电流沉积方法, 在多孔阳极氧化铝(AAO)模板中制备出了具有单晶结构的Ni纳米线阵列. 采用扫描电子显微镜(SEM)、透射电子显微镜(TEM)和X射线衍射(XRD)技术对制备的Ni纳米线阵列的形貌及结构进行了表征. 利用振动样品磁强计(VSM)对单晶Ni纳米线阵列的磁性能进行了研究. 结果表明, 单晶镍纳米线阵列的易磁化方向为纳米线轴向, 并且与多晶纳米线相比显示出了更高的矫顽力. 直径为30 nm的纳米线具有较高的矫顽力(8.236×10^4 A/m)和较高的剩磁比($M_r=0.94M_s$).

关键词 AAO模板 Ni纳米线阵列 单晶 磁性能

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Preparation and Magnetic Properties of Single-crystal Ni Nanowire Arrays

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Abstract

Single-crystal Ni nanowire arrays were prepared by employing the porous AAO template by using the electrodeposition technique at a constant current of 2.0 mA/cm^2. The morphology and microstructure of Ni nanowire arrays were studied by SEM, TEM and XRD techniques. The magnetic properties of the single-crystal Ni nanowire arrays were investigated by VSM. The results reveal that the single-crystal Ni nanowire arrays show a perpendicular magnetic anistory and have a preferential magnetic orientation along the wire axis. The magnetic properties of the single-crystal Ni nanowire arrays are better than those of polycrystal nanowire arrays.

Key words Anodic aluminum oxides template; Ni nanowire arrays; Single-crystal; Magnetic properties

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