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铁磁纳米颗粒系统磁性质对尺寸和各向异性效应的依赖

郑勇林

重庆长江师范学院, 物理系, 重庆, 408100

The character of ferromagnetic nanoparticle system depend to particle size and anisotropy effects

ZHENG Yong-lin

Department of Physics, Yangtze Normal University, Chongqing 408003, China

摘要 研究了随机分布颗粒系统的尺寸、各向异性、矫顽力和温度之间的关系.从Fe_xCu_{1-x},Fe/SiO_2,Fe/Al_2O_3颗粒膜实验结果入手,以Néel-Bron理论和Storner-Wohlfartly模型为依据,建立了描述细磁性颗粒矫顽力H_c与颗粒大小d、热力学温度T的函数关系,并得出在粒径小于d_m(=18~20 nm)范围内,矫顽力随着颗粒的尺寸的增加而迅速地增大,而在颗粒尺寸大于这个范围,则按照$H_c \propto 1/d$规律变化.

关键词: 纳米颗粒尺寸 各向异性 矫顽力 纳米颗粒磁效应

Abstract: It was studied that relation of particle size, anisotropy,and temperature.A relation of coercivity (H_c),particle size (d),and temperature (T) was built by according to experimental results of Fe/SiO_2,Fe/Al_2O_3 and $Fe_{0.3}Cu_{0.7}$ granular filem,and Néel-Bron theory and the Stoner-Wohlfarth model.It was found that the coercive force is granular films as a function of particle diameter (d).With increasing the particle size,H_c increases abruptly and attains maximum around d_m (=18-20 nm),and then decreses as $H_c \propto 1/d$.

Key words: nanoparticles size anisotropy effects coercivity force nanoparticles magnetic effects

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作者简介: 郑勇林(1957-),男,重庆人,教授,主要从事近代物理实验、凝聚态表面复合材料研究.E-mail:zhyong303@163.com.

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