金属学报 1997, 33(6) 625-630 DOI: ISSN: 0412-1961 CN: 21-1139/TG

论文

[Co/Ti],[Co/Cu(Ni)]多层膜的结构与磁性

吴萍;姜恩永;王存达;白海力;刘裕光;王合英

天津大学;天津,300072;天津大学;天津,300072;天津大学;天津,300072;天津大学;天津,300072;天津大学;天津,300072;天津大学;天津,300072

摘要： 用双对向靶溅射方法制备了具有非晶磁性的[Co／Ti]30，[Co／Cu（Ni）]30两组多层膜，分别用X射线衍射、透射电镜和振动样品磁强计做了结构和磁性测量在以非晶Co和Cu－Ni合金构成的[Co／Cu（Ni）]多层膜中，发现饱和磁化强度Ms随非磁性层厚度ds的增加发生振荡变化：在以非晶Co和Ti构成的[Co／Ti]多层膜中，Ms则随ds的增加而减小当ds＞3nm时，两组多层膜的饱和磁化强度均趋向稳定，可用磁性多层膜层间耦合效应予以解释

关键词： [Co／Ti]多层膜 [Co／Cu（Ni）]多层膜 饱和磁化强度 层间耦合 态密度

MICROSTRUCTURE AND MAGNETISM OF[Co/Ti] AND [Co/Cu(Ni)] MULTILAYERS

WU Ping;JIANG Enyong; WANG Cunda; BAI Haili; LIU Yuguang; WANG Heying(Tian jin University, Tianjin, 300072)

Abstract: Two series of the multilayers with the forms of [Co/Ti]30 and[Co / Cu(Ni)]30 prepared by dual facing target sputtering at room temperature, consist ofamorphous Co magnetic layer and exhibit soft magnetic properties. The structural and magnetic properties of [Co/Cu(Ni)] and [Co/Ti] multilayers were examined as a function of thespacer layer thickness (dTi and dCu(Ni)) by XRD, TEM and VSM measurements. The saturation magnetization Ms of the [Co/Ti] multilayer was found to decrease with dTi, but for the[Co/Cu(Ni)] multilayers, the Ms was found to oscillate with dCu(Ni). The Ms approached toa constant value when dTi and dCu(Ni) thickened enough. This is the result of differentinterlayer magnetic coupling effects.

Keywords: [Co/Ti] multilayer [Co/Cu(Ni)] multilager saturation magnetization.interlayer magnetic coupling density of state

收稿日期 1997-06-18 修回日期 1997-06-18 网络版发布日期

DOI:

基金项目:

国家自然科学基金!59672024;;北京中关村地区联合测试中心基金!96J01FJ－108

通讯作者:

作者简介:

作者Email:

参考文献：

1 Parkin S S P,More N,Roche K P.Phys Rev Lett,1990;64:2304

2Barthelemy A,Fert A,Baibich M N,HadjoudjS,Petroff F.J Appl Phys,1990;67:5908
3 Parkin S S P,Bhadra R,Roche K P.Phys Rev Lett,1991;66:2152
4 Inomata K,Yusu K,Saito Y.Mater Sci Eng,1995;B31:41
5Qiu Z Q,Pearson J,Berger A,Bader S D.Phys Rev Lett,1992;68:1398
6 Fub A,Demokritov S,Grunberg P.J Magn Magn Mater,1992:103:L221
7Liu Y H, Zhang Y M,Yan S S, Ma X D. Phys Rev, 1993; B48: 10266
8 Shi Z P and Klein B M.Phys Rev,1995;B52:12516
9Bobo J F,Hennet b,Piecuch M.J Magn Magn Mater,1995;140-144:587
10 Bruno P,Chappert C.Phys Rev Lett.1991;67:1602
11 XU Y B, Lu M, Bie Q S, Zhai Y, Jin Q Y, Zhu X B, Zhai H R. J Magn Magn Mater, 1995;140—144: 581
12 Fabian D T. Band structure spectroscopy ofmetals and alloys.London: Academic Press, 1973: 63,679
13 Leevwen R V,England C D,Dutcher J R,Falco C M.J Appp Phys,1990;67:4910F

本刊中的类似文章

1．于翔, 王成彪, 刘阳, 于德洋 .中频对靶磁控溅射合成TiN/Ti多层膜[J]. 金属学报, 2006,42(6): 662-666

2．程东 严志军 严立.Cu/Ni多层膜强化机理的分子动力学模拟[J]. 金属学报, 2008,44(12): 1461-1464

3．吴萍,姜恩永,刘裕光,王存达.Co/Ti非晶多层膜晶化过程中结构及磁性的变化[J]. 金属学报, 1996,32(11): 1209-1214

4．姜恩永,白海力,王存达.Co/C多层膜的结构稳定性[J]. 金属学报, 1996,32(10): 1068-1074

5．王振军,常香荣,平爵云,田中卓,肖纪美,闻立时.磁控溅射制备Fe/Ti多层膜的结构和磁性[J]. 金属学报, 1996,32(1): 85-90