华东师范大学学报(自然科学版)
JOURNAL OF EAST CHINA NORMAL UNIVERSITY NATURAL SCIENCES

华东师范大学学报(自然科学版) » 2013, Vol. 2013 » Issue (1): 115-120 DOI:

外镀铜层玻璃包裹丝的巨磁阻抗效应

王蕊丽[1, 2], 阮建中[2], 孔祥洪[1], 杨 渭[1], 王江涛[3], 赵振杰[2]

1. 上海海洋大学 物理实验室, 上海 201306;
2. 华东师范大学 物理系 纳光电集成与先进装备教育部工程研究中心, 上海200062;
3. 华东师范大学 软件学院, 上海 200062

Giant magneto-impedance on glass-coated microwires with copper layer

WANG Rui-li [1,2], RUAN Jian-zhong [2], KONG Xiang-hong [1], YANG Wei [1], WANG Jiang-tao [3], ZHAO Zhen-jie [2]

1. Teaching Foundation Department of Physics, Shanghai Ocean University, Shanghai 201306, China;
2. Department of Physics, Engineering Research Center for Nanophotonics and Advanced Instrument, East China Normal University, Shanghai 200062, China;
3. Software Engineering Insititute, East China Normal University, Shanghai 200062, China

- 摘要
- 参考文献
- 相关文章

全文: PDF (1871 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 首先利用高频感应加热熔融拉丝法制备了$Fe_{73.0}Cu_{1.0}Nb_{2.0}Si_{13.5}B_{9.0}$玻璃包裹非晶丝;然后在氮气保护下480~650 ℃之间退火0.5 h; 最后利用化学镀方法在570 ℃退火的玻璃包裹丝上沉积了一层铜, 构成复合结构丝.利用扫描电镜测量了材料的几何尺寸, 研究了玻璃包裹丝退火前后及复合结构丝的巨磁阻抗效应.结果表明, 材料的软磁特性改善提高了材料的磁阻抗比, 铜层与磁性层之间的电磁相互作用也影响磁阻抗比.

关键词: 巨磁阻抗效应 化学镀 趋肤效应 软磁特性

Abstract: The amorphous wires of nominal compositions $Fe_{73.0}Cu_{1.0}Nb_{2.0}Si_{13.5}B_{9.0}$ were prepared by glass-coating melt-spinning method. Then, the wires were annealed at 480~650 ℃ for 30 min in nitrogen atmosphere. The composite wires with copper layer using electroless deposition were produced, a thin layer of copper deposited onto the microwires annealed at 570 ℃. The morphology of composite microwires was observed using SEM. The giant magnetoimpedance effect on the samples was investigated. The results show that soft magnetic properties of the specimen can improve its MI ratio. The electromagnetic interactions between the ferromagnetic core and the copper layer can also affect MI ratio.

Key words: giant magneto-impedance effect electroless deposition skin effect soft magnetic properties

收稿日期: 2012-02-01; 出版日期: 2013-01-25

引用本文:

. 外镀铜层玻璃包裹丝的巨磁阻抗效应[J]. 华东师范大学学报(自然科学版), 2013, 2013(1): 115-120.

. Giant magneto-impedance on glass-coated microwires with copper layer[J]. Journal of East China Normal University(Natural Sc, 2013, 2013(1): 115-120.

服务
- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- E-mail Alert
- RSS

作者相关文章

[1] MOHRI K, KOHZAWA T, KAWASHIMA K, et al. Magneto-inductive effect (MI effect) in amorphous wires[J]. IEEE Trans Magn, 1992, 28: 3150-3152.

[2] KAWASHIMA K, KOHZAWA T, YOSHIDA H, et al. Magneto-inductive effect in tension-annealed amorphous wires and MI sensors[J]. IEEE Trans Magn, 1993, 29: 3168-3170.

[3] CHIRIAC H, OVARI T A, MARINESCU C. Comparative study of the giant magneto-impedance effect in CoFeSiB glass-covered and cold-drawn amorphous wires[J]. IEEE Trans Magn, 1997, 33: 3352- 3354.

[4] VAZQUEZ M. Soft magnetic wires[J]. Physics B, 2001, 299: 302-313.

[5] NAKAI T, ABE H, YABUKAMI S, et al. Impedance property of thin film GMI sensor with controlled inclined angle of stripe magnetic domain[J].

J Magn Magn Mater, 2005, 290-291: 1355-1358.

[6] VAZQUEZ M, ZHUKOV A, ARAGONESES P, et al. Magneto-impedance in glass-coated CoMnSiB amorphous microwires[J]. IEEE Trans Magn, 1998, 34: 724-728.

[7] MORIKAWA T, NISHIBE Y, YAMADERA H, et al. Enhancement of giant magneto-impedance in layered film by insulator separation[J]. IEEE Trans Magn, 1996, 32: 4965-4967.

[8] DE COS D, PANINA L V, FRY N, et al. Magnetoimpedance in narrow NiFe/Au/NiFe multilayer film systems[J]. IEEE Trans Magn, 2005, 41: 3697-3699.

[9] KOMATSU K, MASUDA S, TAKEMURA Y, et al. A novel behaviour of dynamic magnetization process in gold-plated CoFeSiB amorphous wires [J]. IEEE Trans Magn, 1997, 33: 3361-3367.

[10] VELLEUER J, MUNOZ A G, YAKABCHUK H, et al. Giant magneto impedance in electroplated NiFeMo/Cu microwires[J]. J Magn Magn Mater, 2007, 311: 651-657.

[11] WANG R L, ZHAO Z J, LIU L P, et al. Giant magneto-impedance effect on nanocrystalline microwires with conductive layer deposit[J]. J Magn Magn Mater, 2005, 3285: 55-59.

[12] MISHRA A C, SAHOO T, SRINIVAS V, et al, Investigation of magnetoimpedance effect on electrodeposited NiFe/Cu wire using inductance spectroscopy[J]. Physica B, 2011, 406: 645-651.

[13] 王蕊丽，赵振杰，等. 复合丝巨磁阻抗效应的研究[J]. 功能材料，2007, 38(10): 1594-1596.

[14] KAWANABE T, HASEGAWA K, ONO S. Cr migration in CoNiTa/Cr films by annealing[J]. IEEE Trans Magn, 1990, 26(1): 42-44.

[15] PANINA L V, MOHRI K, UCHIYAMA T, et al. Giant magneto-impedance in Co-rich amorphous wires and films[J]. IEEE Trans Magn, 1995, 31: 1249-1253.

[1] 蒋玲;阮建中;赵强;王清江;赵振杰. 溅射工艺对NiFe/Cu复合丝结构和性能的影响[J]. 华东师范大学学报(自然科学版), 2008, 2008(5): 104-109.

[2] 程金科;潘海林;何家康;袁望治. 电流退火CuBe/绝缘层/NiCoP复合结构丝的磁化特性和巨磁阻抗效应[J]. 华东师范大学学报(自然科学版), 2008, 2008(5): 91-97.

[3] 袁 立;杨燮龙;赵振杰. 电流退火对钴基非晶丝巨磁阻抗效应的影响[J]. 华东师范大学学报(自然科学版), 2008, 2008(3): 120-124.

[4] 吴志明;赵振杰;刘龙平;杨燮龙. LC共振增强巨磁阻抗效应[J]. 华东师范大学学报(自然科学版), 2007, 2007(5): 123-127.

[5] 张军车;刘龙平;赵振杰;杨燮龙;王清江 . 铁基纳米晶玻璃包裹丝的直径对巨磁阻抗效应的影响[J]. 华东师范大学学报(自然科学版), 2007, 2007(1): 107-112.

[6] 宋子成;袁望治;赵振杰;阮建中;杨燮龙 . $Ni_{80}Fe_{20}$复合结构多层膜的巨磁阻抗效应研究[J]. 华东师范大学学报(自然科学版), 2007, 2007(1): 127-134.

[7] 吴士蓉;袁望治;阮建中;赵振杰;杨燮龙. 电流退火对NiFeP复合丝巨磁阻抗效应的影响[J]. 华东师范大学学报(自然科学版), 2006, 2006(3): 114-119.

[8] 杨燮龙;赵振杰;袁望治;刘龙平;吴志明. 纳米晶软磁材料的磁性与巨磁阻抗效应(特约综述)[J]. 华东师范大学学报(自然科学版), 2005, 2005(5/6): 25-39.

[9] 王蕊丽;赵振杰;袁望治;阮建中;刘龙平;杨燮龙. 复合玻璃包裹纳米晶细丝的巨磁阻抗效应[J]. 华东师范大学学报(自然科学版), 2005, 2005(5/6): 152-156.

[10] Oumarou M;李晓东;袁望治;阮建中;赵振杰;杨燮龙. 非晶FeCuNbSiB多层膜的巨磁阻抗效应(英)[J]. 华东师范大学学报(自然科学版), 2005, 2005(1): 68-72,1.

[11] 王新征;袁望治;M Oumarou;阮建中;宫峰飞;赵振杰;杨燮龙. 化学镀BeCu/NiFeB丝巨磁阻抗效应研究[J]. 华东师范大学学报(自然科学版), 2004, 2004(2): 64-68.

[12] 刘龙平;赵振杰;阮建中;陈婷;王蕊丽;杨燮龙. 纵向驱动纳米微晶玻璃包裹丝的巨磁阻抗效应[J]. 华东师范大学学报(自然科学版), 2004, 2004(1): 45-48.