

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第19卷 第7期 (总第124期) 2009年7月

 [PDF全文下载]  [全文在线阅读]

文章编号: 1004-0609(2009)07-1300-05

Tb掺杂对CoNbZr纳米薄膜软磁性和微波磁性的影响

邓联文^{1, 2}, 谢海鹏¹, 陈鸿飞¹, 舒 畅^{1, 2}, 周克省¹, 杨兵初¹

(1. 中南大学 物理科学与技术学院, 长沙 410083;
2. 中南大学 粉末冶金国家重点实验室, 长沙 410083)

摘 要: 采用磁控溅射工艺制备CoNbZrTb纳米薄膜, 研究了掺杂稀土元素Tb对薄膜软磁性能、微波磁导率及其频谱特性的影响。结果表明: 少量Tb掺杂(<2%, 摩尔分数)对该类薄膜的微结构和软磁性能影响较小, 薄膜仍可保持非晶态结构和良好的软磁性能, 但Tb掺杂可以显著增强薄膜磁谱的弛豫性, 从而影响其微波磁导率和磁损耗; 随Tb掺杂量的增加, 薄膜的磁各向异性场和共振频率得以有效提高; 薄膜样品在2 GHz处复磁导率的虚部均大于200。掺杂少量Tb的CoNbZrTb非晶态纳米薄膜在 10^9 Hz微波段具有较高磁损耗, 有望在超薄层吸波材料中获得应用。

关键字: Co基纳米膜; Tb掺杂; 磁各向异性; 软磁性能; 微波磁谱

Effect of Tb doping on soft magnetics and microwave permeability of CoNbZr nanostructural films

DENG Lian-wen^{1, 2}, XIE Hai-peng¹, CHEN Hong-fei¹, SHU Chang^{1, 2}, ZHOU Ke-xing¹, YANG Bing-chu¹

(1. School of Physics Science and Technology, Central South University, Changsha 410083, China;
2. State Key Laboratory of Powder Metallurgy, Central South University, Changsha 410083, China)

Abstract: CoNbZrTb nanostructural films were synthesized by RF magnetron sputtering. The influences of Tb doping on the soft magnetic capability and microwave complex permeability were investigated. The results show that the microstructure and soft magnetic parameters change little with a little Tb doping, thus, amorphous microstructure and good soft magnetic performance are still kept, but relaxation in the microwave magnetic spectra is strengthened, and the permeability or magnetic loss also change. With increasing Tb content, the magnetic anisotropy field and resonant frequency are improved remarkably. The imaginary part of complex permeability of CoNbZrTb films at 2 GHz are all larger than 200. The nanostructural CoNbZrTb films present large magnetic loss in 10^9 Hz frequency range. It is possible for these films to be applied in the field of microwave absorption with super thin absorbing layers.

Key words: Co-based nanostructural films; Tb doping; magnetic anisotropy; soft magnetic capability; microwave permeability spectra

版权所有：《中国有色金属学报》编辑部 湘ICP备09001153号

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-88876765, 88877197, 88830410 传真： 0731-88877197

电子邮箱： f-ysxb@mail.csu.edu.cn