

研究论文

掺杂 Co^{2+} 和 Sm^{3+} 对纳米 ZnFe_2O_4 铁氧体的电磁损耗性质的影响

庄稼^{*1}, 陈学平², 迟燕华¹, 杨定明¹

(¹西南科技大学材料科学与工程学院 绵阳 621002)

(²西南应用磁学研究所 绵阳 621000)

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摘要 采用 NaHCO_3 与 $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ 和 $\text{Sm}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ 进行室温固相反应制得碱式碳酸盐和氢氧化铁混合前驱物, 先微波加热,

再热分解分别制得复合氧化物 ZnFe_2O_4 , $\text{Co}_{0.5}\text{Zn}_{0.5}\text{Fe}_2\text{O}_4$ 和 $\text{Co}_{0.5}\text{Zn}_{0.5}\text{Fe}_{1.95}\text{Sm}_{0.05}\text{O}_4$. 由激光粒度分析仪、

XRD 和 SEM 表征: 获得了颗粒分布均匀、平均粒度为 62 nm 左右的立方晶系尖晶石结构的纳米铁氧体粉体.

并测试样品的相对介电常数和相对磁导率, 研究了它们的电磁损耗特性. 结果表明: 在 ZnFe_2O_4 中, 掺入 Co^{2+} , Sm^{3+}

元素可以在 100~1800 MHz 测试频率范围内不同程度提高材料的电磁损耗特性.

关键词 [纳米铁氧体](#) [稀土掺杂](#) [固相合成](#) [电磁损耗](#)

分类号

Effect of Sm^{3+} and Co^{2+} doping into ZnFe_2O_4 Nano-ferrite on Electromagnetic Loss

Property

ZHUANG Jia^{*1}, CHEN Xue-Ping², CHI Yan-Hua¹, YANG Ding-Ming¹

(¹ Institute of Material Science and Engineering, Southwest University of Science and Technology, Mianyang 621002)

(² Southwest Institute of Applied Magnetism, Mianyang 621000)

Abstract The precursors of basic carbonates and ferric hydrate for ferrite were prepared by solid-state reaction at room temperature and characterized by TG-DSC. The nanometer spinel ferrites with the average size of 62 nm were obtained by microwave heating at 600 W for 10 min, then thermolysis at 550 °C, and studied by a laser granularity analyzer, XRD and SEM. The electromagnetic loss property was studied by the relative dielectric constant and relative magnetic permeability of the ferrites. The results show that when Co^{2+} partially substituted Zn^{2+} in ZnFe_2O_4 , the electromagnetic loss property of materials was obviously improved in 100~1800 MHz. On the other hand when Fe^{3+} was substituted less by Sm^{3+} in $\text{Co}_{0.5}\text{Zn}_{0.5}\text{Fe}_2\text{O}_4$, the electromagnetic loss property of materials was increased properly.

Key words [nanoferrite](#) [rare earth doped](#) [solid state synthesis](#) [electromagnetic loss](#)

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通讯作者 庄稼 zj@swust.edu.cn

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