

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第19卷 第8期 (总第125期) 2009年8月

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文章编号: 1004-0609(2009)08-1455-07

纤维/ NiFe_2O_4 复合陶瓷惰性阳极的制备及性能

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摘 要: 以高温固相合成法, 采用两步烧结法制备镀铜碳纤维增强的纤维/ NiFe_2O_4 复合陶瓷惰性阳极, 即先以 NiO 、 Fe_2O_3 、微量 V_2O_5 和 MnO_2 为原料制备 NiFe_2O_4 尖晶石基体材料, 然后以该 NiFe_2O_4 尖晶石基体材料和镀铜碳纤维为原料, 采用冷压烧结法制备纤维/ NiFe_2O_4 复合陶瓷惰性阳极。研究镀铜碳纤维添加量对 NiFe_2O_4 复合陶瓷惰性阳极体积密度、气孔率和抗弯强度的影响。结果表明: 添加镀铜碳纤维可以显著改善 NiFe_2O_4 复合陶瓷材料的性能, 当镀铜碳纤维添加量为3%(质量分数)时, 其体积密度比不添加镀铜碳纤维试样的体积密度提高约12%, 其抗弯强度比不添加镀铜碳纤维的提高约22%。

关键字: 纤维/ NiFe_2O_4 复合陶瓷; 惰性阳极; 镀铜碳纤维; 两步烧结; 体积密度; 抗弯强度

Preparation and properties of fiber/ NiFe_2O_4 composite ceramic inert anodes

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Abstract: Two-step sintering process was adopted to prepare fiber/ NiFe_2O_4 composite ceramic inert anodes with copper-coated carbon fiber by solid-state reaction. NiFe_2O_4 spinel matrix material was prepared first using NiO , Fe_2O_3 , trace V_2O_5 and MnO_2 as raw materials. Then, fiber/ NiFe_2O_4 composite ceramic inert anodes were prepared by cold pressing with sintering method using the above NiFe_2O_4 spinel matrix material and copper-coated carbon fiber as raw materials. The effects of addition of copper-coated carbon fiber on the bulk density, porosity and bending strength were studied. The results show that, the addition of copper-coated carbon fiber can significantly improve the properties of NiFe_2O_4 composite ceramic. The bulk density of the samples is improved by about 12% and the bending strength of samples is improved by

about 22% with 3%(mass fraction) copper-coated carbon fiber.

Key words: fiber/ NiFe_2O_4 composite ceramic; inert anodes; copper-coated carbon fiber; two-step sintering; bulk density; bending strength

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