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化学镀Ni-P-ZrO₂工艺及性能

江文辉

(中南大学化学化工学院, 湖南长沙 410083)

摘要: 以NiSO₄为施镀主盐, 次亚磷酸钠为还原剂研究了化学镀法在工件表面获得良好性能的Ni-P-ZrO₂镀层的工艺. 用正交试验法确定了镀液的最佳成分, 考察了施镀温度、搅拌速度、ZrO₂微粒的添加量对镀层形成的影响, 并用X射线衍射和电子探针对接镀层的结构进行了分析. 结果表明, 镀液的最佳组成为: NiSO₄ 30 g·L⁻¹, 配合剂 18 g·L⁻¹, 稳定剂 2 g·L⁻¹, 次亚磷酸钠 20 g·L⁻¹, 促进剂 15 g·L⁻¹; 施镀工艺条件为: 施镀温度 85~90℃, ZrO₂微粒加入量 10~20 g·L⁻¹, 在施镀过程中采用间歇式搅拌法; 经过300℃以下的热处理后镀层结构仍为非晶态结构, 经过300℃以上的热处理后, 则变为晶体结构; 用以上方法获得的镀层为高磷镀层. 此外, 用浓度为10%(质量分数)的盐酸检验镀层的耐蚀性, 结果表明ZrO₂微粒的加入不会影响Ni-P基质层的抗蚀性. 因此, 采用本工艺能获得性能优良的Ni-P-ZrO₂合金镀层, 且性能比Ni-P镀层有显著提高.

关键字: 化学镀; 复合镀层; Ni-P-ZrO₂合金

Process and properties of electroless plating Ni-P-ZrO₂ alloy

JIANG Wen-hui

(College of Chemistry and Chemical Engineering, Central South University, Changsha 410083, China)

Abstract: Using NiSO₄ as dissolving salt, NaH₂PO₄ as reductant in the solution, the process of electroless plating of Ni-P-ZrO₂ alloy was studied. The solution's composition was set up with the orthogonal layout. The composition of the solution were as follows: NiSO₄ 30 g·L⁻¹, accessory ingredient 18 g·L⁻¹, stabilize 2 g·L⁻¹, NaH₂PO₄ 20 g·L⁻¹, accelerant 15 g·L⁻¹. It is found that temperature, speed of stirring and content of ZrO₂ particles have effects on the forming of the cladding. By X-ray analysis, the Ni-P-ZrO₂ cladding remains amorphous material with heat treating below 300℃, but above 300℃, the cladding becomes crystal. The tissue and construction of the cladding have an effect on the properties of the cladding. The results of cladding corrosion resistance test show that ZrO₂ particles have effects on the cladding corrosion resistance, a fine Ni-P-ZrO₂ cladding could be prepared by the process, and its properties were obviously better than that of Ni-P alloy.

Key words: electroless; composite cladding; Ni-P-ZrO₂ alloy

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地 址：湖南省长沙市中南大学 邮 编： 410083

电 话： 0731-88879765 传 真： 0731-88877727

电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号