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钨含量对铝合金化学镀Ni-W-P 硬度和耐磨性的影响

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摘 要: 研究铝合金化学镀Ni-W-P三元合金的耐磨性能, 探讨钨含量对铝合金(LY12)化学镀Ni-W-P耐磨性和硬度的影响。结果表明: 铝合金表面化学镀Ni-W-P三元合金在400 °C加热1 h后, 表面硬度达HV₂₅1 080, 表面硬度和耐磨性均较基体提高10倍以上; 但过高的W含量, 使得表面硬度下降。磨损实验发现, 试样产生了镀层碎裂和剥落现象。其主要原因是由于铝合金基体与镀层热膨胀系数的差异及Ni₃P的析出导致应力过大, 引起镀层硬度和耐磨性随着W含量的增加而下降。并用化学镀Ni-W-P合金沉积机理解释了镀层成分分布特征的形成原因。

关键字: Ni-W-P合金; 化学镀; 耐磨性

Effect of content of tungsten on hardness and wear resistance of electroless Ni-W-P plating on aluminium alloy

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Abstract: The wear resistance of electroless Ni-W-P coatings on aluminium alloy was studied, the effect of content of tungsten on the wear resistance and hardness of electroless Ni-W-P deposits was discussed. The results show that the hardness of deposit heated at 400 °C for 1 h is HV₂₅1 080, and the wear resistance and hardness of deposits heated at 400 °C for 1 h are ten times more than those of aluminium matrix. With increasing content of W, the hardness of Ni-W-P coatings decreases. Disintegration and spall on the Ni-W-P deposits heated at 400 °C for 1 h were generated after abrasion test because of the excessive stress caused by different coefficient of thermal expansion between matrix materials and deposits and precipitation of Ni₃P. The characteristic of electroless Ni-W-P deposits composition distribution is explained by aggradational deposition mechanism of electroless Ni-W-P deposits.

Key words: Ni-W-P alloy; electroless plating; wear resistance

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