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电解液组成对ZAlSi12Cu2Mg1微弧氧化陶瓷膜的影响

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摘要: 采用电解液成分逐渐加入法, 在6种电解液中对ZAlSi12Cu2Mg1试样进行微弧氧化处理, 研究电解液组成对微弧氧化陶瓷膜形成的影响, 寻找合适的电解液组成。结果表明: 电解液组成对陶瓷膜层的厚度、粗糙度、硬度、耐磨性、膜层微观形貌及相组成的影响很大, 通过调节电解液成分, 可获得性能优良的陶瓷膜。适宜的电解液组成为: 8 g/L NaSiO₃, 1 g/L NaOH, 2 g/L Na₂WO₄, 0.5 g/L Na₂EDTA及10 mL/L丙三醇。在此种电解液组成下, 获得的陶瓷膜厚156 μm, 面粗糙度为259 nm, 显微硬度达HV 891。在干摩擦条件下, 经30 min磨损后, 其磨损仅为基体的13.29%。观察膜层微观形貌, 膜层均匀致密。XRD分析表明: 氧化层中含有Al、莫来石、SiO₂、α-Al₂O₃、γ-Al₂O₃和WO₃相。

关键字: ZAlSi12Cu2Mg1; 电解液组成; 微弧氧化; 陶瓷膜

Effects of electrolyte constitutes on ceramic coatings of ZAlSi12Cu2Mg1 by micro-arc oxidation

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Abstract: ZAlSi12Cu2Mg1 samples were treated by microarc oxidation (MAO) in six different electrolytes. To obtain appropriate electrolyte constitutes, the effects of electrolyte constitutes on ceramic coatings of ZAlSi12Cu2Mg1 MAO were investigated. The results indicate that the electrolyte composition has great influence on thickness, roughness, microhardness, wear resistance, morphology and phase compositions of ceramic coating. The fine ceramic coating is obtained by changing electrolyte. The appropriate electrolyte constitutes are 8 g/L Na₂SiO₃, 1 g/L NaOH, 2 g/L Na₂WO₄, 0.5 g/L Na₂EDTA and 10 mL/L glycerin. In this electrolyte, it is feasible to obtain a 156 μm thick coating, the roughness decreases to 259 nm and the microhardness increases to HV 891. The wear mass loss of coating after 30 min is only 13.29% of the matrix, which is relative to ZAlSi12Cu2Mg1 under the condition of dry friction. The morphologies of coatings are continuity and density. The XRD analysis indicates that coatings are composed of mullite, SiO₂, α-Al₂O₃, γ-Al₂O₃ and WO₃.

Key words: ZAlSi12Cu2Mg1; electrolyte constitute; microarc oxidation; ceramic coatings

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