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溶质离子在铝合金微弧氧化陶瓷膜形成过程中的作用机理

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摘 要: 利用交流脉冲微弧氧化电源在碳酸钠、硅酸钠和锡酸钠3种电解液中对LY12铝合金进行微弧氧化处理, 通过SEM和XRD观察分析铝合金样品表面形貌和相组成的变化, 研究各溶质离子对微弧氧化起弧现象及生长曲线的作用规律。结果表明: 在3种电解液中进行微弧氧化处理时, 在硅酸钠溶液中铝合金易于起弧, 能够在短时间、低电压下获得高阻抗膜; 而在锡酸钠溶液中铝合金不能形成高阻抗膜, 未发生起弧现象; 铝合金样品表面预先制备高阻抗膜有利于发生微弧氧化起弧现象; 在碳酸钠和硅酸钠溶液中, 微弧氧化陶瓷膜的后期生长曲线有着相似的变化规律, 在锡酸钠溶液中样品表面产生电化学溶解, 不能形成陶瓷膜; 铝合金样品表面形成高阻抗膜是微弧氧化现象得以进行的必要条件。

关键字: LY12铝合金; 微弧氧化; 溶质离子; 高阻抗膜

Action mechanism of solute ions on forming process of microarc oxidation coatings on aluminium alloy

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Abstract: LY12 aluminium alloy was processed by microarc oxidation in Na_2CO_3 , Na_2SiO_3 and Na_2SnO_3 solutions using AC electrical source. The effects of solute ions on the surface morphologies and phases of aluminium alloy samples were investigated by SEM and XRD, respectively. The effect rules of arc starting and growing curves were contrastively studied. The results show that in the above three electrolytes, arc starting can occur easily in Na_2SiO_3 solution, and high impedance coating can be prepared in short time at low voltage. Arc starting phenomenon cannot happen in Na_2SnO_3 solution. The phenomenon of arc starting will occur easily when high impedance coating occurs on the surface of aluminium alloy sample. Growing curves of ceramic coatings have similar rule during forming microarc oxidation coating in Na_2CO_3 and Na_2SiO_3 solutions. The sample is dissolved by galvano-chemistry in Na_2SnO_3 solution and the ceramic coating cannot be formed. The necessary condition of occurring microarc oxidation phenomenon is that high impedance coating must be formed on the

surface of aluminium alloy.

Key words: LY12 aluminium alloy; microarc oxidation; solute ion; high impedance coating

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