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## **Investigation of micro-arc oxidation coating growth patterns of aluminum alloy by two-step oxidation method**

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### **Abstract**

The micro-arc oxidation (MAO) process of 2A70 aluminium alloy in different electrolytes containing silicate or phosphate by two-step oxidation was investigated. The growth rate, surface roughness and element distributions of the micro-arc oxidation coatings were characterized. The results show that the coating growth patterns are different in Si and P electrolytes although they both grow inward. The discharge channels formed in Si-electrolyte and P-electrolyte are trumpet-shaped and dumbbell-shaped, respectively. The trumpet-shaped channel is conducive to gather heat and extend the reaction area inward, which leads to a layer growth pattern in P-electrolyte. The dumbbell-shaped channel limits the reactive area but introduces more electrolytes during the cooling process, which results in an island growth pattern in Si-electrolyte. Therefore, a newly formed P-rich layer can be observed between substrate and initially formed Si-rich layer after the second-step oxidation in P-electrolyte, but only localized Si-rich areas could be found when the second-step oxidation was performed in Si-electrolyte.

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