

## Formation of SiAlON Coatings on 6061 Aluminum Alloys by Electrolytic Plasma Processing

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Electrolytic plasma processing (EPP) is a novel electrochemical and physical surface treatment process for generating protective coatings on light metals. Because they can present high hardness and continuous barriers, these coatings can offer good protection against abrasion, corrosion and heat as well as electrical insulation. SiAlON, known as a high performance ceramic, is a unique material exhibiting many important properties which is widely applied and suitable for the protective coatings of Al alloy. In the present work, 6061 series aluminum alloy is chosen as the matrix material for its wide application in engineering to make SiAlON coatings by EPP method. According to previous researches, the experiments carried out on 6061 aluminum alloys in weak alkaline electrolytes which are environmental friendly. The experimental electrolyte composition includes: 0.5-2g/L NaOH as the electrolytic conductive agent, 2-30g/L  $\text{Na}_2\text{SiO}_3$  as alumina formative agent, 0.3-1g/L  $\text{NaNO}_3$  as a nitride supply agent. A combined composition and structure analysis of the coating layer was carried out by XRD, OM, SEM/EDS for the specimens PEO-treated at room temperature for 5 min in 200DC plus different AC 50Hz power supplies (140~220V). In addition, micro hardness on the surface and cross section layer were measured to correlate the evolution of microstructure and resulting mechanical properties. A composite of sheaf-like structural SiAlON coating was formed as a result of a reactive process between Al in the alloy itself and Si-O-N supplied by the electrolyte. The SiAlON coating presents high hardness and anti-abrasion behaviors.

Keywords: Electrolytic Plasma Processing; SiAlON; Al6061 alloy; Coating

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Poster presentation