Short Communication

Electrodeposition and Anodization of Al-TiO₂ Composite Coatings for Enhanced Photocatalytic Activity

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In this study, we investigated the feasibility of a new process for the fabrication of Al-based composite coatings containing TiO₂ particles with high photocatalytic activity. In the first step of this process, Al-TiO₂ composite coatings were electrodeposited in a dimethyl sulfone–aluminum chloride bath with suspended TiO₂ particles yielding Al-matrix composite coatings with uniformly dispersed TiO₂ particles. Subsequently, the electrodeposited Al-TiO₂ composite coatings were anodized in oxalic aqueous solution. Through this anodization step, the Al matrix was converted into an alumina layer with many nanopores extending from the surface of the coating toward the substrate. As a consequence, a porous alumina layer supporting TiO₂ particles was formed. The photocatalytic activity of the anodized composite coatings was confirmed to be higher than that of the as-deposited coatings.

Keywords: composite electrodeposition; composite electroplating; aluminum electrodeposition; anodization; photocatalyst

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