Addition of LuCl_3 for Improving Micro-structure and Corrosion Resistance of Micro-arc Oxidation Coating Formed on 6061

Dan Xiong¹, Ping Wang^{1,2,*}, Xiao Wei Shen¹, Ji Wei Liu¹, Biao Yang¹, Yun Bai Gong¹,
Ze Yu Gong¹, Jie Hu¹, Dong Xiang¹

¹ School of New Energy and Materials, Southwest Petroleum University, Chengdu, 610500, China

² School of Physics, University of Electronic Science and Technology of China, Chengdu, 611731, China

Corresponding author: Wang Ping, Ph.D., Professor, School of Materials Science and Engineering, Southwest Petroleum University, Chengdu, 610500, China, P. R. China, Tel: 028-83037405,

*E-mail: 818wp@163.com

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LuCl_3 was added to an electrolyte to prepare micro-arc oxidation coatings on 6061 aluminium alloys. The influence of LuCl_3 on the micro-structure and properties of the MAO coating was studied by Scanning Electron Microscope, Energy Dispersive Spectrometer, X-ray Diffraction and electrochemical workstation. Results showed that the addition of LuCl_3 caused a change in the oxidation voltage, which affected the micro-structure and performance of the coating. The micro-arc oxide coating containing LuCl_3 was mainly composed of $\gamma\text{-Al}_2\text{O}_3$ and SiO_2 . LuCl_3 entered the coating in the form of LuCl_3 and $\text{Lu}_2(\text{C}_2\text{O}_4)\cdot\text{H}_2\text{O}$. The micro-arc oxidation coating formed in the electrolyte containing LuCl_3 was denser, smoother and less porous, with higher hardness and better corrosion resistance than the coating without LuCl_3 . Therefore, the addition of LuCl_3 into the electrolyte could change the oxidation process of the micro-arc oxide coating, thus improving the micro-structure and corrosion resistance of the coating.

Keywords: Micro-arc oxidation; LuCl_3 particles; 6061 aluminum alloy; Structure; Corrosion resistance

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