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An investigation about the evolution of microstructure and composition difference between two interfaces of plasma electrolytic oxidation coatings on Al

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Abstract: The plasma electrolytic oxidation (PEO) coatings were fabricated on AA1060 aluminum alloy at a constant current density of 4.4 A/dm². The images of discharge sparks and voltage-time response were recorded during the PEO process. The characteristics of the two interfaces of coatings were investigated as a function of PEO processing time by using X-ray diffraction (XRD), scanning electron microscopy (SEM) with energy dispersive X-ray spectroscopy (EDS). Hundreds of coatings were detached from the substrate by an electrochemical method and ground into homogeneous powders to carry out differential scanning calorimeter (DSC) and further XRD qualitative test. In addition, matrix-flushing method was employed to quantitatively measure the content evolution of phase compositions of Al-based detached PEO coatings. The distribution rule of amorphous phases in the PEO coatings was investigated by thickness-reduction method for the first time. Based on the experiments above, gaining an insight into the formation, distribution and evolution of the amorphous and crystalline phases in the PEO process.

Key words: Plasma electrolytic oxidation; Amorphous phase; Crystalline phase;

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