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Influence of polyethylene glycol on cathode plasma electrolytic depositing Al₂O₃ anti-oxidation coatings

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Abstract

Al₂O₃ anti-oxidation coatings were prepared by cathode plasma electrolytic deposition (CPED). The kinetics of CPED process was investigated by cathode current density-voltage curves on the samples with different surface placement directions. As polyethylene glycol (PEG) is added in solution, the spark ignition current density $i_{c(\text{spark ignition})}$ is reduced significantly, and the influence of surface placement directions of cathode on CPED process becomes very weak. Consequently, plasma discharges ignite randomly at whole cathode surface, which would be favorable for the formation of uniform Al₂O₃ coatings on large-sized cathode with complex shapes. Owing to adding PEG in solution, the oxidation and spallation resistance of the coating are improved, and the critical load of coating is increased.

Key words: A. Films; B. Surfaces; Ceramic; D. Al₂O₃; E. Thermal applications

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