

Short Communication

Effect of Annealing on Microstructure and Capacitance Properties of Sol-gel TiO₂ Film on Aluminum

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Sol-gel TiO₂ film prepared by dip-coating on aluminum was annealed under different temperatures, and subsequently anodized in ammonium adipate solution. The microstructure and capacitance properties of TiO₂ film on aluminum was investigated by X-ray diffraction (XRD), Raman spectroscopy (RS), thermogravimetric differential scanning calorimetry (TG-DSC), atomic force microscope (AFM), and capacitance temperature (C-T) test, respectively. The results indicated that TiO₂ film on aluminum annealed at 400 °C and 500 °C showed nanocrystalline anatase in 1-5nm and 5-12nm particles, respectively, while that annealed at 600 °C showed mixed nanocrystalline phase (anatase and rutile) in 5-15nm particles. The anatase quantity developed remarkably with annealing temperature. The controlling factor of phase transformation of Sol-gel TiO₂ film was annealing temperature, and the aluminum foil substrate had little effect. Compared to specimens without TiO₂ film, the specific capacitance of TiO₂ coated specimens after anodizing at 400 °C, 500 °C and 600 °C was increased by 15%, 35% and 74%, respectively.

Keywords: Aluminum electrolytic capacitor; anodizing; annealing; TiO₂ film;

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