An analysis of the electrolyte resistivity effect on the pore diameter and pore density of anodic aluminium oxide (aao) films produced by single-step anodization

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Abstrak

Nanoporous anodic aluminum oxide (AAO) layers were successfully fabricated on aluminum foil through an anodizing process in oxalic acid and mixed electrolytes of sulfuric and oxalic acid. The effect of electrolyte resistivity on the morphology of nanoporous AAO, such as pore diameter and pore density, was investigated. The nanoporous AAO layers‘bmorphology was examined using field emission scanning electron microscopy (FE-SEM) and analyzed using image analysis software. The results showed that anodizing in mixed electrolytes (sulfuric and oxalic acid) produced a much smaller pore diameter and a much higher pore density at lower voltage compared to anodizing in a single oxalic acid. For the anodizing process in oxalic acid, the pore diameters ranged from 14 to 52 nm, and the pore density ranged from 34?106 pores in 500×500 nm2. The anodizing process in the mixed electrolytes resulted in pore diameters within the range of 7?14 nm, and the pore densities were within the range of 211?779 pores in 500×500 nm2. Overall, increasing the electrolyte resistivity within the same solution leads to decreased pore diameter.