

Microstructural studies of pure aluminum and Al1100: the effect of grain size and boundaries on quality of anodic aluminum oxide template

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Anodic aluminium oxide template (AAO) has been used extensively to synthesize one-dimensional nanomaterials like metals, metal oxide and organic materials. To fabricate AAO, some pre-treatments on the surface of aluminium, are necessary. One of them is heat treatment to obtain desired grain size and crystallographic sites. Temperature and time of heating change the microstructure of aluminium consequently the template quality. The regularity and distribution of pores which are forming in anodic film, are strongly influenced by the surface structure of Al.

The microstructure of pure Al and Al1100 substrates was investigated at three different temperatures; at room temperature, 250 °C and 500 °C. Extensive microstructural characterization was carried out and the average grain size and particle distribution were obtained. Annealing promotes less surface defects, larger grain size and fewer boundaries which improve the quality of fabricated template on heat-treated substrate.

The morphology of the oxide films were studied by SEM. The heat treatment conditions were investigated for Al1100 to improve the regularity and pores distributions of the template fabricated from this substrate. The results showed that Al1100 could be an alternative for pure aluminum in the fabrication of AAO.