Influence of Electrolyte Temperature on the Formation of the Morphology of the Porous Structure of Anodic Aluminum Oxide

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2021

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Keywords: Anodic aluminum oxide, morphology, electrolyte temperature

Abstract: The results of research on anodizing thin aluminum films 100 nm thick on SiO2–Si plates at 30 V in a 0.3 M aqueous solution of oxalic acid are presented. The effect of the electrolyte temperature on

the morphology of porous anodic aluminum oxide (PAAO) films is studied. The pore diameter and interpore distance are determined by the computer analysis of the SEM images of the morphology of the anode films using the ImageJ software. The data obtained show that the pore diameter does not depend on the temperature of the electrolyte and the time of the process, but is determined only by the anodizing voltage. In the electrolyte temperature range of 5 to 40°C, the pore diameter of the PAAO films is 20 ± 0.5 nm, and the interpore distance is 77.7 nm. The research results indicate that a change in the temperature of the electrolyte, in contrast to the anodizing voltage, affects only the growth rate of the anode film, and not its porous morphology.

This article published in: Influence of Electrolyte Temperature on the Formation of the Morphology of the Porous Structure of Anodic Aluminum Oxide / K. Chernyakova [etc all] // Glass Physics and Chemistry. – 2021. – Vol. 47. – № 6. – P. 630-634. – https://doi.org/10.1134/S1087659621060043.

Internet-link for the article:

https://link.springer.com/article/10.1134%2FS1087659621060043.