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二次阳极氧化法制备多孔氧化铝膜

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摘要 文章介绍采用二次阳极氧化法制备孔洞规则、有序的多孔氧化铝膜的工艺。多孔阳极氧化铝(AAO)膜孔径为20～100 nm，孔道相互平行且垂直于表面，深度可达50 μm。详细分析了第1次阳极氧化、去除氧化层、第2次阳极氧化、扩孔过程中孔结构发生的变化。研究了不同电解液、阳极氧化温度、外加电压等对多孔氧化铝结构的影响。分析了多孔氧化铝膜的表面及侧面形貌、表面微区成分。在草酸溶液中氧化所得的AAO膜孔径相对在硫酸溶液中的较大。在一定范围内，增加氧化温度及氧化电压能提高AAO膜孔径。

关键词 多孔氧化铝膜 纳米孔阵列 自组织

分类号

Fabrication of Porous Anodic Alumina Films by Using Two-Step Anodization Process

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Abstract This article introduces the fabrication of the porous anodic alumina films which have ordeed pore arrangement by using a two-step anodization process. The films have a parallel channel structure which nanopore diameter can be 20-100 nm, and depth can reach 50 μm. The change of pore structure in the first and second anodization, moving the alumina layer, widening process was detailedly analysed. The effect of the parameters such as different electrolytes, anodization temperature and the voltage on the nanopore structure was studied. The surface and profile structure through FE-SEM (field emission scanning electron microscope), the element composition in tiny area of the anodic aluminum oxide (AAO) surface were studied. The result indicates the pore diameter of AAO which is anodized in oxalic acid solution is larger than which anodized in sulfuric acid solution. The anodization temperature and voltage can enlarge the nanopore diameter of AAO in a range.

Key words porous anodic alumina films _ nanopore arrays _ self organization

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