

The formation of highly ordered nano pores in Anodic Aluminum Oxide.

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There has been increasing interest in the fabrication of nano-sized structures because of their various advantages and applications. Anodic Aluminum Oxide (AAO) is one of the most successful methods to obtain highly ordered nano pores and channels. Also it can be obtained diverse pore diameter, density and depth through the control of anodization condition.

The three types of substrates were used for anodization; sheets of Aluminum. Aluminum on Si wafer and Aluminum on Mo-coated Si wafer. In Aluminum sheet, a highly ordered array of nanoholes was formed by the two step anodization in 0.3M oxalic acid solutions at 10°C. After the anodization, the remained aluminum was removed in a saturated HgCl₂ solution. Subsequently, the barrier layer at the pore bottoms was opened by chemical etching in phosphoric acid. Finally, we can obtain the through-channel membrane. In these processes, the effect of various parameters such as anodizing voltage, anodizing time, pore widening time and pre-heat treatment are characterized by FE-SEM (HITACH-4700). The pore size, density and growth rate of membrane are depended on the anodizing voltage and temperature respectively. The pore size is proportional to applied voltage and pore widening time. The pore density can be controlled by anodizing temperature and voltage.

Optimized conditions of AAO on aluminum sheet are applied for fabricating AAO/Si and AAO/Mo/Si. Pore density and diameter can be also controlled by anodizing voltage and widening time. Fabricated three types of AAO were perpendicular to substrate and aligned, which can be used for template of nano materials with a shape of rod and carbon nanotube.

Keywords : Anodized aluminum oxide, membrane, nano channel