

Field Emission Characteristics of Carbon Nanotube in Anodic Aluminum Oxide Nano-Template formed on a Silicon Wafer by Multi-Step Anodization

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Even without an electropolishing process, thin film anodic aluminum oxide (AAO) templates have been fabricated on a silicon wafer by multi-step anodization. Ordered AAO templates were made by anodization of aluminum with a relatively flat surface obtained by thermal evaporation. The ordering of pore arrangement is improved by increasing the number of anodization steps.

The emission characteristics of CNTs on the AAO template with different growth temperature were measured. As the CNTs growth temperature increased, current density also increased at same applied field. This might be due to the increase of CNT crystallinity at higher growth temperature. In the high applied field region, the emission current fluctuated in the case of growing CNTs at 600 °C. It is clear that the CNTs have poor crystallinity due to the low growth temperature and weak catalytic activity of the AAO template for cracking of hydrocarbon. On the other hand, current fluctuation was not observed in the case of growing CNTs at 700 °C and 800 °C.