

AAO template 에서 수직 배열된 탄소나노튜브를 이용한 삼극관 구조의
전계 방출 소자

**Triode type field emission device based on the well-aligned
CNTs grown on AAO template**

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The application of carbon nanotubes (CNTs) in field emission has been investigated by many researchers. However, the exploitation of the properties of carbon nanotubes in this field to get a good device is still difficult and stalemated problem. In this paper, we propose some solutions with improving quality of the triode type field emission using CNTs grown on anodic aluminum oxide (AAO) template. Those are improving the quality, together with distribution and geometry of the CNTs. The triode type field emission properties become better when quality of the emitter material, CNTs, is highly graphitized and the structure of device is suitable. The thermal chemical vapor deposit (CVD) was used for synthesizing CNTs. The growth temperature and ratio gases in the method have a part in advancing quality of the CNTs. The AAO is as a supporter to enhance adhesion of the CNTs with silicon substrate, and keeping the CNTs stable in the verticality. The order arrangement of the pores of the AAO template has made the uniform CNTs in the triode type field emission device. Beside of that controlling the length of the exposed CNTs is also more convenient and easier through controlling the rate and time of the AAO etching process. Therefore, the CNTs after exposing have a well-alignment and arrangement. It means we can fabricate the triode type with appropriate structure for field emission. The analysis in properties of material and device was carried out by scanning electron microscopy (SEM), transmission electron microscopy (TEM), Raman spectroscopy and so on. The triode type field emission device with few milli-amperes per square centimeter is easy to us to get it.

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