

## **Optimization of CNT tips for Field Emission Display**

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### **Abstract**

Electron field emission also known as cold emission, emit intense electron beam from the sharp tip under a strong electric field, has been paid much attention in recent years. Due to the small diameter, high aspect ratio, unique electrical, mechanical and thermal properties, Carbon Nanotubes (CNT) show great potential as field emitters with very low turn on field and high current density. In this paper we report the work carried out towards the development of diode type 8x8 matrix flat panel display using carbon nanotube electron emitters. A large area (1.2cm x 1.0cm approximately) electron field emitter and an alphanumeric display, using CNT based emitters were assembled and tested under dynamic conditions. CVD and PECVD techniques were used to grow selectively vertically aligned multi wall carbon nanotubes on patterned silicon substrate. Low energy phosphor for improved brightness was deposited over the patterned ITO glass, by electrophoresis technique, to be used as anode. Field emission current measurements were carried out inside the specially designed Field Emission measurement chamber maintained at the vacuum better than  $1 \times 10^{-6}$  mbar. The field emission behavior has been confirmed by measuring the I-V data. For large area display the current density of  $28\text{mA}/\text{cm}^2$  was achieved at a field of  $5\text{V}/\mu\text{m}$ . The initially observed non-uniformity in the brightness was successfully eliminated by conditioning the sample at high fields for sufficiently long duration.