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Thermal Field Emission from a Single Carbon Nanotube
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Carbon nanotubes (CNTs) exhibit excellent characteristics in field-induced electron emission with high brightness, stable emission current, long service time and narrow energy distribution. But it is still not clear how carbon nanotubes behave under high electric field and high temperature. We have characterized the thermal field emission properties of an individual multiwalled carbon nanotube fabricated by a two step process. The characterization was conducted in the transition zone between thermionic emission and field emission. An approximation has been made to the Murphy-Good equation so that the temperature at the CNT apex can be extracted. The boundary of transition zone was determined experimentally by activating thermal field emission at various temperatures. We also show that higher temperature will improve the emission stability and remove disruptions in the emission current.

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