Electrically driven thermal light emission from individual single-walled carbon nanotubes

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Our field effect transistor structure utilizes a clean, as-grown nanotube suspended across a trench, allowing for low contact resistance and good isolation from the substrate. The spectra from quasi-metallic nanotubes reveal pronounced peaks in the visible and infrared corresponding to $E_{11}$ and $E_{22}$ transitions. The emission rates show strong correlation with electrical power dissipated in the devices, consistent with thermally excited emission due to resistive heating. We observe similar behavior for the semiconducting devices, although electroluminescence in these nanotubes has been explained by either carrier injection or impact excitation.