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Localized Photoresponse and Raman Spectra of Long Carbon Nanotube FET's JAMES TSANG, MARCUS FREITAG, PHAEDON AVOURIS, IBM T. J. Watson Research Center — The spatially resolved photoresponse, and Raman spectra of CVD grown carbon nanotube field effect transistors with channel lengths between 2 and 50λm have been measured using conventional imaging techniques at photon energies between 1.4 and 2.7eV. A strong localized photoresponse including both the short circuit photocurrent and the high impedance photovoltage is observed even at zero bias with spatially resolvable contributions from the Schottky barriers, from observable inhomogeneities and from fluctuations all along the device. The magnitude of the photoresponse from defects such as tube crossings and fluctuations in the tube environment can be comparable to or stronger than that arising from the charge separation at the Schottky barriers. The Raman spectra show high quality CNTs with some correlation between the spatial positions of weak D lines, when observed, and changes in the photoresponse. Comparisons of the Raman spectra and the intensity of the photoresponse show the presence of significant potential fluctuations on the micron length scale along these devices

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