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Dependence of Raman-active modes on the external voltage in single-wall carbon nanotube thin films GIOVANNI FANCHINI, GOKI EDA, HUSNU EMRAH UNALAN, MANISH CHHOWALLA, Materials Science and Engineering - Rutgers University — We report on Raman measurements under the application of an external voltage in gap-cell devices made by transparent and conducting single-wall carbon nanotube (SWNT) thin films [1] Two different Raman excitation wavelengths (785 and 633 nm) were used. Application of voltage results in downshifts of the D and G modes and in reduction of their intensity. The intensities of the radial breathing modes increase with voltage in metallic SWNTs, while decreasing in semiconducting SWNTs. A model explaining the phenomenon in terms of both direct and indirect (Joule heating) effects of the field is proposed. Our work rules out the elimination of large amounts of metallic SWNTs in thin film transistors using high field pulses. Our results support the existence of Kohn anomalies in the Raman-active optical branches of metallic graphitic materials. Additional Raman measurements in SWNT thin film transistors at varying source-drain voltage and gate voltage will be presented as well. [1] G Fanchini, et al, submitted [2] S.Piscanec et al, PRL 93 (2004) 185503

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