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Phonon populations in a biased carbon nanotube transistor
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PHAEDON AVOURIS, IBM TJ Watson Research Center — We present a compre-
hensive picture of the phonon populations in an electrically-driven carbon nanotube
transistor, including the Raman-active G and radial breathing modes (RBM), and
also the Raman-inactive zone boundary mode (K), and intermediate-frequency mode
(IFP), populated by anharmonic decay. The effective temperature of the RBM is
considerably lower than the intermediate- and high-frequency mode temperatures,
which we explain by a phonon-decay bottleneck. We include substrate polar phonon
scattering to fully account for the device electronic characteristics.

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