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Strong electromechanical coupling in ultra-short carbon nanotube quantum dots A.C. MCRAE, V. TAYARI, J.O. ISLAND, A.R. CHAMPAGNE, Department of Physics, Concordia University — We study electromechanical coupling in suspended single-wall carbon nanotubes using low-temperature electron transport. Using a feedback-controlled electromigration method [1], we create gate-tuneable single quantum dots whose lengths range from tens of nm down to $\approx$ 3 nm. We observe current suppression of low bias stretching vibron sidebands due to the Franck-Condon blockade, and extract the electron-vibron coupling strength, g, both in the electron and hole doped regimes in the same devices. We observe strong g and are exploring its dependence on mechanical strain in the tube. Due to a positive feedback mechanism between tunneling electrons and bending mode vibrations of the nanotubes, we observe bending mode frequencies up to the 100 GHz range [2]. The bending mode frequency is found to be tuneable by a factor of two by applying electrostatic strain.

[1] J.O. Island *et al.* Appl. Phys. Lett. **99**, 243106 (2011)
[2] J.O. Island *et al.* Nano. Lett. **12**, 4564 (2012)

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