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Torsional Electromechanics of Carbon Nanotubes ERNESTO JOSELEVICH, TZAHI COHEN-KARNI, LIOR SEGEV, ONIT SRUR-LAVI, SIDNEY R. COHEN, Weizmann Institute of Science, Israel — Carbon nanotubes are known to be distinctly metallic or semiconducting depending on their diameter and chirality. Here we show that continuously varying the chirality by mechanical torsion can induce conductance oscillations, which can be attributed to metal-semiconductor periodic transitions. The phenomenon is observed in multi-walled carbon nanotubes, where both the torque and the current are shown to be carried predominantly by the outermost wall. The oscillation period with torsion is consistent with the theoretical shifting of the corners of the first Brillouin zone of graphene across different subbands allowed in the nanotube. Beyond a critical torsion, the conductance irreversibly drops due to torsional failure, allowing us to determine the torsional strength of carbon nanotubes. Our experiments indicate that carbon nanotubes could be used as self-sensing torsional springs for nanoelectromechanical systems (NEMS). [1] E. Joselevich, Twisting nanotubes: From torsion to chirality, *ChemPhysChem* **2006**, 7, 1405. [2] T. Cohen-Karni, L. Segev, O. Srur-Lavi, S. R. Cohen, E. Joselevich, Torsional electromechanical quantum oscillations in carbon nanotubes, *Nature Nanotechnology*, **2006**, 1, 36.

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