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Nanowire friction with an applied bias HAKAN PETTERSSON, Center for Applied Mathematics and Physics, Halmstad University, Box 823, 30118, Halmstad, Sweden, GABRIELA CONACHE, STRUAN GRAY, ALINE RIBAYROL, LINUS FROBERG, LARS SAMUELSON, LARS MONTELIUS, Lund University, Solid State Physics, Box 118, 22100, Lund, Sweden — Recently, we have shown how the friction experienced by nanowires pushed by an AFM tip can be determined by measuring their radius of curvature after manipulation [1]. It is of fundamental interest to know whether the wires behave like macroscopic objects, or if they are more like true atomic-scale point contacts where friction becomes independent of the applied normal force. Here we study how the friction between InAs nanowires and a SiN layer on conductive silicon varies when a DC voltage is applied. The tip charges the capacitor formed by the wire and the silicon back contact, causing attractive Coulomb forces and so increasing the contact pressure. A monotonic increase of the sliding friction with voltage was observed. This implies that the friction increases with the normal force and that this mesoscopic system behaves more like a macroscopic contact, despite being only nanometers in size in the direction of motion.

[1] Conache et al. Small 5(2) 203 (2009)

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