Field Emission from a Nanomechanical Pillar\textsuperscript{1} HYUN KIM, HUA QIN, ROBERT BLICK, Laboratory for Molecular Scale Engineering, Electrical and Computer Engineering, University of Wisconsin-Madison, MICHAEL WEST-PHALL, LLOYD SMITH, Department of Chemistry, University of Wisconsin-Madison — We have measured the field emission in a nano-electromechanical structure in which a nanometre silicon pillar oscillates in between the source and drain electrodes. The device consists out of a mechanically flexible pillar with a length of some 200 nm and a diameter of some 50 nm and allows for mechanical resonant excitations at radio frequencies ($10 \sim 1000$ MHz) and mechanical clocking of the field emitted electrons. Operation of the device at room temperature in the frequency range of 300 $\sim$ 400 MHz is presented. For AC and DC drive, the current shows a rich frequency dependent response. A modified Fowler-Nordheim field emission curve is observed and attributed to the effect of oscillating pillar excited by an alternating electric field.

\textsuperscript{1}This work was supported by AFOSR (F49620-03-1-0420)