Abstract Submitted
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Toward single-molecule nanomechanical mass spectrometry W.K. HIEBERT[1], X.L. FENG, M.L. ROUKES, California Institute of Technology — Nanoelectromechanical systems (NEMS) offer immense potential for high-sensitivity applications in sensor technology. In mass sensitivity, recent reports have logged dramatic progress with milestones at the level of, first, single femtogram, then single attogram[2], and most recently few zeptogram[3] – pushing the state of the art to over a billion times the sensitivity of commercially-available mass sensors. It is now conceivable "to weigh" single macromolecules of viruses and proteins, simply by accreting them one-by-one onto a NEMS device[4]. When achieved, the ability to weigh single molecules may provide a tranformationally different core sensing mechanism and a new niche platform for mass spectrometry. The experimental approach underway at California Institute of Technology to achieve this measurement milestone will be discussed.

[1]Also with National Institute for Nanotechnology, Edmonton, Canada
[2]M. L. Roukes and K. L. Ekinci, U. S. Patent 6,722,200 (filed: 4 May 2001, granted: 20 April 2004); see also Appl.Phys.Lett. **84**, 4469 (2004).
[3]Y. T. Yang, Carlo Callegari, X. L. Feng, Kamil L. Ekinci, and M. L. Roukes, "Zeptogram Scale Nanomechanical Mass Sensing," this meeting.
[4]K. L. Ekinci, Y. T. Yang, and M. L. Roukes, "Ultimate limits to inertial mass sensing based upon nanoelectromechanical systems," J. Appl. Phys. **95**, 2682 (2004).

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