Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Dielectrophoretic Tweezers as a Platform for Single Molecular Force Spectroscopy in a Highly Parallel Format PENG CHENG, MICHAEL BARRETT, PIERCEN OLIVER, DMITRI VEZENOV, Chemistry Department, Lehigh University — Miniaturization has driven down the cost of tools used in bioanalysis and diagnostics, with single molecules becoming the ultimate detection limit. I will describe how one can exploit mechanical properties of individual biomolecules to determine changes in their state or structure. Our aim is to build a force-spectroscopy-on-a-chip device that can detect and manipulate many (millions) single molecules in parallel. A critical element of this approach is the design of materials properties of molecular handles or probes. By tuning interactions of these probes with electric fields which generate by a simple electrode geometry, we are able to apply piconewton forces to individual DNA molecules and record their response with a single base sensitivity. I will present how we determined the approximate crossover frequency between negative and positive DEP using plain electrodes instead of conventional micro-structures. The technique is attractive not only for conducting single molecule force spectroscopy but also for label-free single cell detection. I will discuss potential applications of this approach to high throughput analyses such as genome sequencing and HIV detection.

Peng Cheng
Chemistry Department, Lehigh University

Date submitted: 27 Dec 2011 Electronic form version 1.4