Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Hydrodynamic resistance of confined cells in rectangular microchannels ZEINA S. KHAN, SIVA A. VANAPALLI, Texas Tech University, Department of Chemical Engineering — Several microfluidic approaches have been developed to screen suspended cells mechanically in microchannels by exploiting characteristics that are linked to their individual mechanical properties. Typically changes in cell shape due to shear-induced deformation and transit times are reported; while these measurements are qualitative compared to more precise techniques such as atomic force microscopy and micropipette aspiration their advantage lies in throughput, with the ability to screen hundreds to thousands of cells in a minute. We study the potential of a microfluidic cell squeezer to characterize the hydrodynamic resistance of LNCaP prostate cancer cells by measuring dynamical pressure-drop variations along a micrometer-sized channel. The hydrodynamic resistance of the cell introduces an excess pressure drop in the narrow channel which depends on the mechanical stiffness of the cell. We additionally visualize the cell size and assess the influence of cell size on the hydrodynamic resistance of each cell, demonstrating the capability of the microfluidic cell squeezer to yield the hydrodynamic resistance as a mechanical fingerprint of cells.

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Date submitted: 29 Dec 2010 Electronic form version 1.4