ABSTRACT
We have developed an efficient, label-free method of screening cells for their phenotypic profile, which we call Node-Pore Sensing (NPS). NPS involves measuring the modulated current pulse caused by a cell transiting a microchannel that has been segmented by a series of inserted nodes. Previously, we showed that when segments between the nodes are functionalized with different antibodies corresponding to distinct cell-surface antigens, immunophenotyping can be achieved. In this talk, I will show how we have significantly advanced NPS by simply inserting between two nodes a “contraction” channel through which cells can squeeze. “Mechano-NPS”, as we now call our method, can simultaneously measure a cell’s size, resistance to deformation, transverse deformation, and ability to recover from deformation. As I will demonstrate, mechano-NPS can distinguish malignant from non-malignant epithelial cells, discriminate between sub-lineages and chronological age groups of primary human mammary epithelial cells, and track malignant progression. I will discuss mechano-NPS’s potential clinical application in early breast cancer detection.

BIOGRAPHICAL SKETCH
Lydia L. Sohn received her A.B. (Chemistry and Physics, 1988), M.S. (Physics, 1990), and Ph.D. (Physics, 1992) from Harvard University. She was an NSF/NATO postdoc at Delft University of Technology and a postdoc at AT&T Bell Laboratories (1993-1995). Sohn was an Assistant Professor of Physics at Princeton University prior to joining the Mechanical Engineering Dept. at UC Berkeley in 2013. Her work focuses on developing quantitative techniques to probe single cells. Sohn has received numerous awards including the NSF CAREER, Army of Research Young Investigator Award, DuPont Young Professor Award, and a Bakar Fellowship. In 2014, she was one of five winners in the “Identifying Platform Technologies for Advancing Life Sciences Research” competition for her work on Node-Pore Sensing. Most recently, she was elected a Fellow of the American Institute for Medical and Biological Engineering.