Microchannel resonators are MEMs-fabricated, vacuum-packaged fluidic microchannels whose mechanical resonant frequency changes in response to the mass they contain. With sub-femtogram ($<10^{-15}$ g) resolution, these sensors can measure the mass, density, and size of individual micro- and nano-scale particles with resolution and accuracy that surpasses mature technologies such as light scattering. This talk will survey the capabilities and applications of this technology for nanoparticle characterization, as well as efforts underway to push the mass sensitivity toward nanoparticles and viruses as small as 10 nm. In addition, gentle fluidics allow measurement of living bacteria, algae, and mammalian cells with resolution far beyond conventional methods such as the Coulter counter. Monitoring the growth of individual cells is enabling fundamental studies of the cell cycle, cancer, and drug susceptibility.

Demonstration to follow.