MicroElectroMechanical Systems (MEMS): From Neural Aging to HIV monitoring in the developing world

I will describe two novel bio-MEMS microdevices: (i) a worm-on-chip microfluidic device that can be used to manipulate individual nematodes (*C. elegans)* and image *in vivo* their neural responses at the single neuron level. Functional imaging data from aged neurons indicate for the first time that neural degradation is affected by aging. These microfluidic devices can be further automated for use in high-throughput anti-aging drug screening applications, and (ii) a portable, inexpensive, MEMS-based system for counting the absolute number of $CD4^+$T cells in HIV-infected patients living in resource-limited settings. Such a system can reach the end-user wherever limited infrastructure is present and no access to a hospital or clinic is possible. I envision that this technology will not only make it possible to monitor the efficacy of an individual's therapy in the developing world, but it will make more medicines available by identifying patients who need a treatment from patients who do not need it.

Nikos Chronis received his B.S. and Ph.D. degrees from Aristotle University (Greece) and University of California at Berkeley in 1998 and 2004 respectively, both in mechanical engineering. In 2000, he joined the Berkeley Sensor and Actuator Center at the University of California at Berkeley as a graduate student researcher under the supervision of Luke Lee. In 2004, he worked as a postdoctoral researcher at Cori Bargmann's lab at Rockefeller University (New York) where he developed microfluidic tools for studying neural networks in the nematode *C. elegans*. In September of 2006, he joined the faculty of Mechanical Engineering at the University of Michigan as an assistant professor. His research interests include polymer MEMS, point-of-care microfluidics, optical MEMS for lab-on-chip applications, and in-vivo imaging of neural circuits in *C. elegans*. He is the recipient of the 2009 NIH Director's New Innovator Award.