Worm on the Run – A versatile force-sensing platform for the study of freely moving nematodes

V. Nock\textsuperscript{1}, S. Johari\textsuperscript{2}, M.M. Alkaisi\textsuperscript{1}, W. Wang\textsuperscript{3}

1 MacDiarmid Institute for Advanced Materials and Nanotechnology, Department of Electrical and Computer Engineering, University of Canterbury, Christchurch, New Zealand
2 School of Microelectronic Engineering, Universiti Malaysia Perlis, Malaysia
3 Department of Precision Instruments, Tsinghua University, Beijing, China

To study the interplay of microorganisms with their physical environment we have developed an integrated Lab-on-a-Chip type platform capable of measuring mechanical forces exerted during locomotion of microorganisms\textsuperscript{1,2}. Using this platform we found that crawling behaviors and thrust forces of moving \textit{C. elegans} correlate to the structure of their microenvironment as the worm adjusts its behavior via mechanical sensing of its surroundings\textsuperscript{3}. The sense of touch is crucial to these nematodes: 6 touch receptor neurons (mechanoreceptor neurons) allow the animal to detect external mechanical feedback with the environment, as well as internal forces\textsuperscript{4}. Using our platform we were able to quantify forces, as well as locomotion parameters such as speed, amplitude of sine wave, and wavelength. In this seminar I will introduce the measurement platform, sensing principle and its application to freely moving \textit{C. elegans} in conjunction with optogenetic manipulation\textsuperscript{5}.

References: