The Scientific Committee of Targeting Mitochondria 2013 asked Pr Wallace to present the recent studies realized in collaboration with Pr Peter J. Burke from the University of Integrated Nanosystem Research Facility, Electrical Engineering and Computer Science, University of California, Irvine, California. This study was published in Analytical Chemistry last May.

**About the study:**
Using nanofluidic channels in PDMS of cross section 500 nm × 2 μm, we demonstrate the trapping and interrogation of individual, isolated mitochondria. Fluorescence labeling demonstrates the immobilization of mitochondria at discrete locations along the channel. Interrogation of mitochondrial membrane potential with different potential sensitive dyes (JC-1 and TMRM) indicates the trapped mitochondria are vital in the respiration buffer. Fluctuations of the membrane potential can be observed at the single mitochondrial level. A variety of chemical challenges can be delivered to each individual mitochondrion in the nanofluidic system. As sample demonstrations, increases in the membrane potential are seen upon introduction of OXPHOS substrates into the nanofluidic channel. Introduction of Ca2+ into the nanochannels induces mitochondrial membrane permeabilization (MMP), leading to depolarization, observed at the single mitochondrial level. A variety of applications in cancer biology, stem cell biology, apoptosis studies, and high throughput functional metabolomics studies can be envisioned using this technology.