



## “BNC Seminar”

November 19th, 2012 @ 3:00pm

BRK, ROOM 2001

**W. Mike Arnold**

**The MacDiarmid Institute for Advance Materials and Nanotechnology at Industrial Research Limited (IRL), Lower Hutt, Wellington, New Zealand**

**Title: Studies of Particle Size and Aggregation Using a Tuneable Nanopore**

**Bio:** Mike Arnold studied Biochemistry, Marine Science and Electronic Engineering Science in the UK. During post-doctoral work in Jülich, Germany and later as a University Lecturer, he developed the electro-rotational method of single-cell dielectric spectroscopy and also worked on commercial apparatus for dielectrophoresis and cell fusion. Following the award of the Dr. rer.nat. habil. (equivalent to the D.Sc.) degree in Biotechnology from the University of Würzburg, Mike moved to Industrial Research Limited (IRL) in New Zealand in 1994, initially to work on impedance spectroscopy and further methods of cell and carbon nanotube electromanipulation.

Mike is a Principal Research Scientist at IRL, and an Associate Investigator of the MacDiarmid Institute for Advanced Materials and Nanotechnology. He is leader of the Nano & Micro Fluidics Team at IRL, with activity in microfluidic fabrication, fluorescent and magnetic labels, and nanopore technology. He is also active in areas of polymer microfabrication, cell manipulation and dielectric media. Mike's spare time is divided between tree-planting, bush-walking, cycling and flying.

**Abstract:** When insulating particles suspended in a conducting salt solution pass through a pore of comparable size, the conductance through the pore is decreased in proportion to the volume of the particle. The tuneable nanopore is fabricated in an elastomeric sheet and can be re-sized “on the fly” to suit the particle size. The resistive pulse data that can be obtained from this relatively simple device is similar to that from a Coulter Counter used for biological cells, except that the size range of measurable particles extends down to the 100-nanometer level. The device is well suited to distinguishing sub-populations of particle sizes, and to studies of particle aggregation and growth. Due to the single-particle nature of the technique, the tunable nanopore demonstrates better resolution in such studies than that of DLS (dynamic light-scattering). Present work in the IRL laboratory is directed to determination of particle zeta potential or charge: the device is also being used to give controlled variation in particle separations at the nano-scale.

IRL and MacDiarmid work together with the manufacturers Izon Science on extend-ing this technology and its applications, but without any commercial linkage.