IEEE
Western Australia Section

Joint Chapter ESP:
Electron Devices Society
Solid State Circuits Society
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Accuracy and Precision at the Nano Length Scale

A Seminar of the IEEE WA joint EDS/SSCS/IPS Chapter

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36 Bradfield Road, Lindfield NSW 2070

Thursday, 26 September 2019 @ 1.00 PM

Venue: **Billings Room 3.04, 3rd floor. Electrical & Electronic Engineering Building**
University of Western Australia, Crawley

This seminar is open to the public and admission is free to all IEEE members and non-members

Abstract:

The National Measurement Institute is responsible for developing, maintaining and disseminating Australia's physical national standards, including for dimensional measurements at the nanoscale, in support of the Australian nanotechnology community. Here, I will present our primary standard for nanoscale dimensional measurement, which is realised by an in-house designed and built metrological scanning probe microscope (mSPM). SI traceability is achieved by heterodyne interferometry measuring the displacement of the sample translation stage, relative to a fixed tip, using a frequency stabilised laser. Our mSPM operates in frequency modulation dynamic atomic force microscopy mode using a quartz tuning fork oscillator as a force sensor, with conventional AFM probes attached. For a typical measurement of step heights (below 100 nm), experimentally characterised sub-nanometre accuracy is achieved.

In addition to the mSPM, our Nanometrology team also runs a suite of instrumentation for the measurement of (nano)particles in liquid suspension within our Particle Characterisation Facility. Resonant mass measurement is one example of the instruments available within this facility. It offers the unique capability of being able to measure the buoyant mass of nano- and sub-micron objects on a particle-by-particle basis and to build up mass and size distributions of statistically relevant populations within a short period of time. Currently available commercial instrumentation allows measurement with sub-femtogram sensitivity. For gold nanoparticles suspended in water, this equates to a ~60 nm diameter particle. In addition, the technique offers the possibility of determining object density.

Biography:

Dr Coleman received her PhD in 2006 from Professor Jagadish's group at the ANU on defect engineering in ZnO. After a post-doc at Uppsala University on magnetic doping of ZnO for potential applications in spintronics, Dr Coleman returned to Australia in 2008 to commence work in the then newly established Nanometrology group at NMI. She is now the leader of that team, and is particularly interested in the development of accurate and comparable measurement techniques for the characterisation of nanomaterials. She currently serves as the Chair of the Asia Pacific Metrology Programme's Technical Committee for Materials Metrology, and is also the current Chair of the Australian Institute of Physics' Women in Physics group (soon to be Diversity and Equity Group in Australian Physics). Aside from metrology, Dr Coleman enjoys hiking and has a new found love of the ukulele.