



Seminars at the
Melbourne Centre for
Nanofabrication



Micro-nanofabrication and Microscopy with light noble ion beams

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151 Wellington Road, Clayton, 3168

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Meeting ID: 823 4174 1876 and passcode: 638277



Micro-nanofabrication and Microscopy with light noble ion beams

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Abstract:

The Materials Characterisation and Fabrication Platform (MCFP) at the University of Melbourne operates a Zeiss ORION NanoFab helium ion microscope (HIM), one of only four in Australia. HIM is a scanned ion probe instrument that is similar in many respects to that of the well-established scanning electron microscope (SEM). The fundamental difference is clear in the name, with our source being one of (typically) helium ions generated from the gas field ion source, rather than electrons as in SEM. This affords benefits to the microscopist: we can image insulating materials without coating while maintaining high vacuum and high beam energy, we have outstanding surface sensitivity normally reserved for very low-kV SEM, and being an ion beam we can perform high spatial resolution fabrication switching between helium and neon as our source.

After an overview and introduction to the technique and its benefits, I will overview some of the key areas of research HIM has excelled at supporting in recent years at the MCFP and in Australia, with an aim to demonstrate cross-disciplinary applications. We will look at graphene and 2D nanomaterials, thin polymer coatings on carbon fibres, carbon nanospheres, cellular biology including bacteria and biofilms, through to micro-nanofabricated structures such as ultra-nanocrystalline diamond coatings, 2-photon-polymerisation printed structures, and plasmonic devices and nanostructured molecular gratings fabricated using the instrument.



Dr Anders Barlow is an Academic Specialist within the Materials Characterisation & Fabrication Platform (MCFP) at The University of Melbourne where he manages the electron and ion microscopy (HIM) node alongside other synergistic instruments. Dr Barlow's primary research interest lies in instrument and multi-technique development, leveraging the strengths of multiple techniques against one-another to achieve solutions for challenging research questions. He is an advocate for the HIM technology in Australia, is the HIM representative in the AMMS Focussed Ion Beam Special Interest Group (FIB-SIG), is an engaged member in the ANFF network supporting researchers and industry in their fabrication and characterisation challenges, and has developed online learning content for HIM, SEM and FIB as part of these expert working groups.