Seminars at the Melbourne Centre for Nanofabrication

Dr Grant van Riessen & Alaleh Aminzadeh

ANFF-VIC Technology Ambassador Series

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2-3pm

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Nanofabrication and devices for coherent x-ray applications

Dr Grant van Riessen

ANFF-VIC Technology Ambassador / La Trobe Institute for Molecular Science

Abstract:

Recent advances in synchrotron radiation sources and detectors have enabled novel experimental methodologies that depend on nano- and microfabricated optics, sample environments, and sample delivery systems. In this talk we will provide an overview of work by La Trobe University researchers to develop efficient nanofocusing optics and microelectrochemical devices for in situ soft X-ray spectromicroscopy, and microfluidic devices with integrated plasmonic sensors for serial synchrotron crystallography.
The first results from characterising these devices using synchrotron radiation will be described, including initial results demonstrating the feasibility of electrochemical in situ X-ray spectromicroscopy. We will also outline some of emerging opportunities for both characterisation and fabrication enabled by our recent work using ANFF-Vic facilities.

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Progress in fabrication of soft X-ray optics for coherent imaging applications

Alaleh Aminzadeh

PhD Student / La Trobe Institute for Molecular Science

Abstract:

Lensless microscopy methods using high-brilliance synchrotron sources are widely used to investigate the structural, chemical or magnetic properties of technical and biological materials at the nanoscale. To meet the challenge of characterising matter with spatiotemporal heterogeneity across multiple length scales, it is necessary to improve the precision and efficiency of the optics that are used to produce a beam below 100 nm while preserving the wavefront of the coherent X-ray beam. Efficiency is especially important for experiments using soft X-rays that are limited by the available detector technology and for which the X-ray energy may be varied by more than one order of magnitude to probe element-specific properties.

Here we will report on progress fabricating high-efficiency soft X-ray Fresnel lenses and kineforms using thermal scanning probe lithography. We will also describe the modelling, and preliminary testing of wavelength tunable diffractive transmission lenses fabricated by electron beam lithography. The fabrication processes and plans for future enhancement will be discussed.

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