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Probing materials at 100 nm resolution by AFM-based near field FTIR

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Developments to enable infrared microspectroscopy to extend beyond the far field diffraction limit are being undertaken at several accelerator facilities worldwide. These include the CLIO Free Electron Laser (Paris, France), LNLS (Campinas, Brazil), and the ALS infrared beamline (Berkeley, USA). Without such developments, the spatial resolution in the mid-IR is typically 3 to 5 microns. Two alternative techniques based on photothermal expansion (CLIO) and on near-field scattering from an AFM probe (LNLS, ALS) are used by these facilities, and a beamline dedicated to this technique is planned for LNLS, with potential to push the spatial resolution limit to less than 100 nm. The IR beamline group at the Australian Synchrotron have gained experience of both methods, through successful beamtime at CLIO and at the ALS. Results from the most recent beamtime at the ALS AFM-IR beamline instrument show the potential to collect representative IR spectra from sub micron samples which had not been achievable using the IR beamline at the Australian Synchrotron. Details of the instrumentation at the ALS beamline will be described, along with results from samples, including the detection surface glucan molecules on the hyphae of Candida albicans fungi. Such instrumentation could potentially be installed as an add-on to the IRM beamline at the Australian Synchrotron.

Keywords or phrases (comma separated)

FTIR, near field, AFM, infection

Summary

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