Electronic Supplementary Material (ESI) for Analyst.
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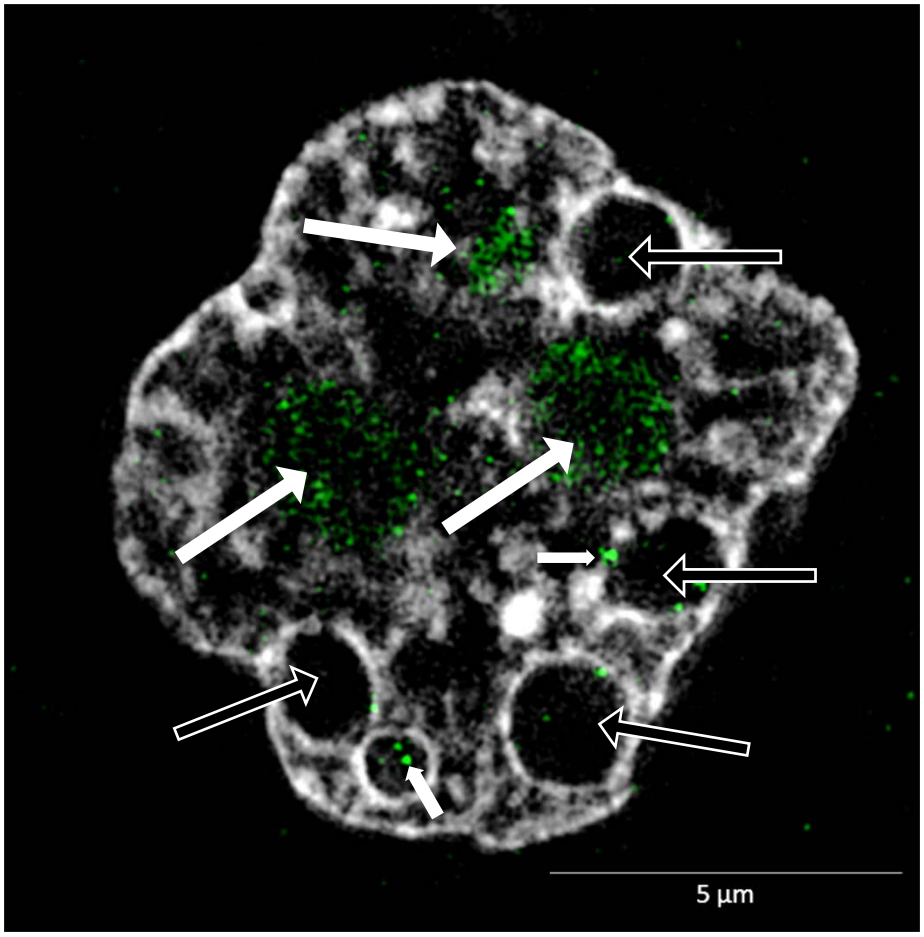
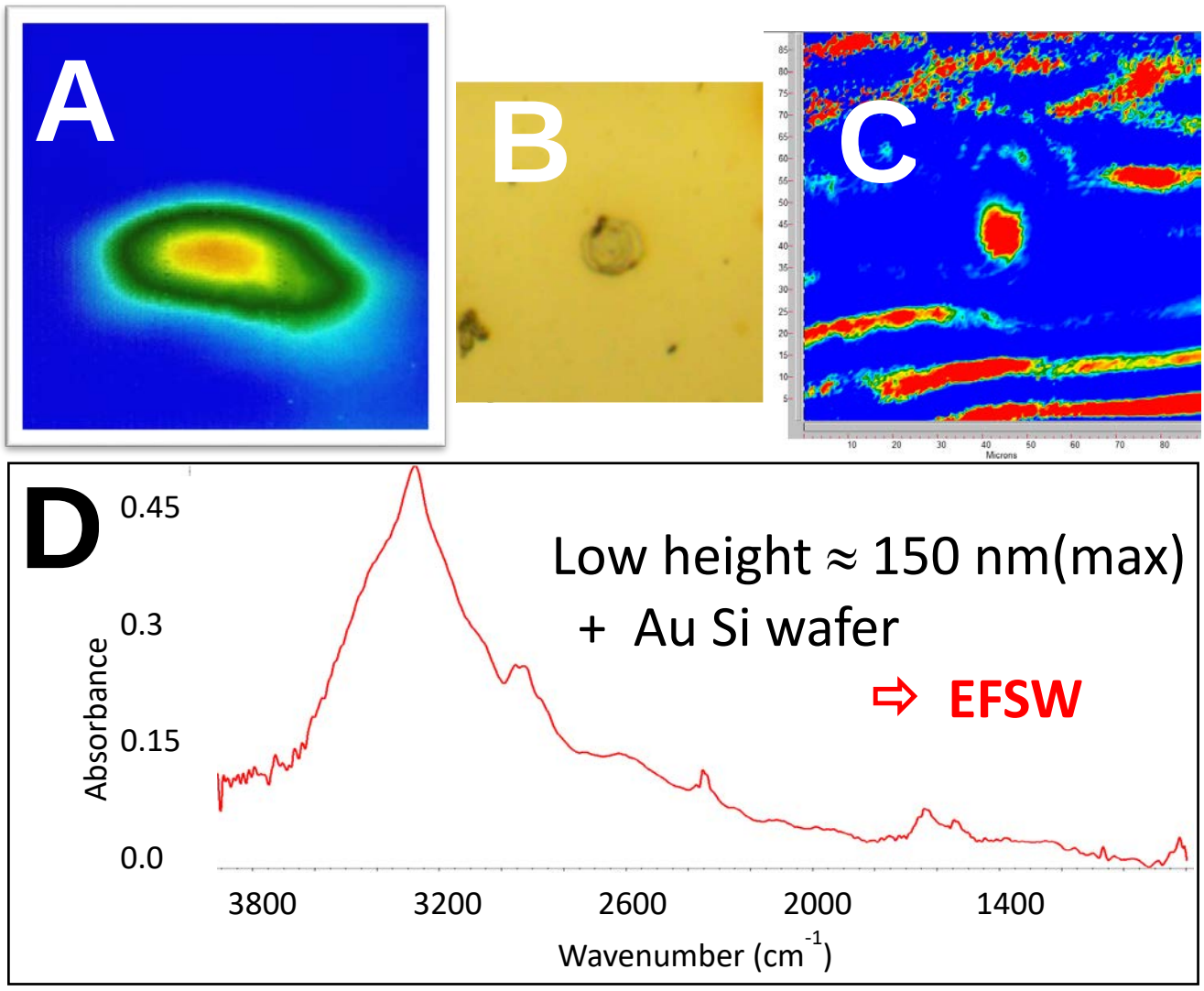
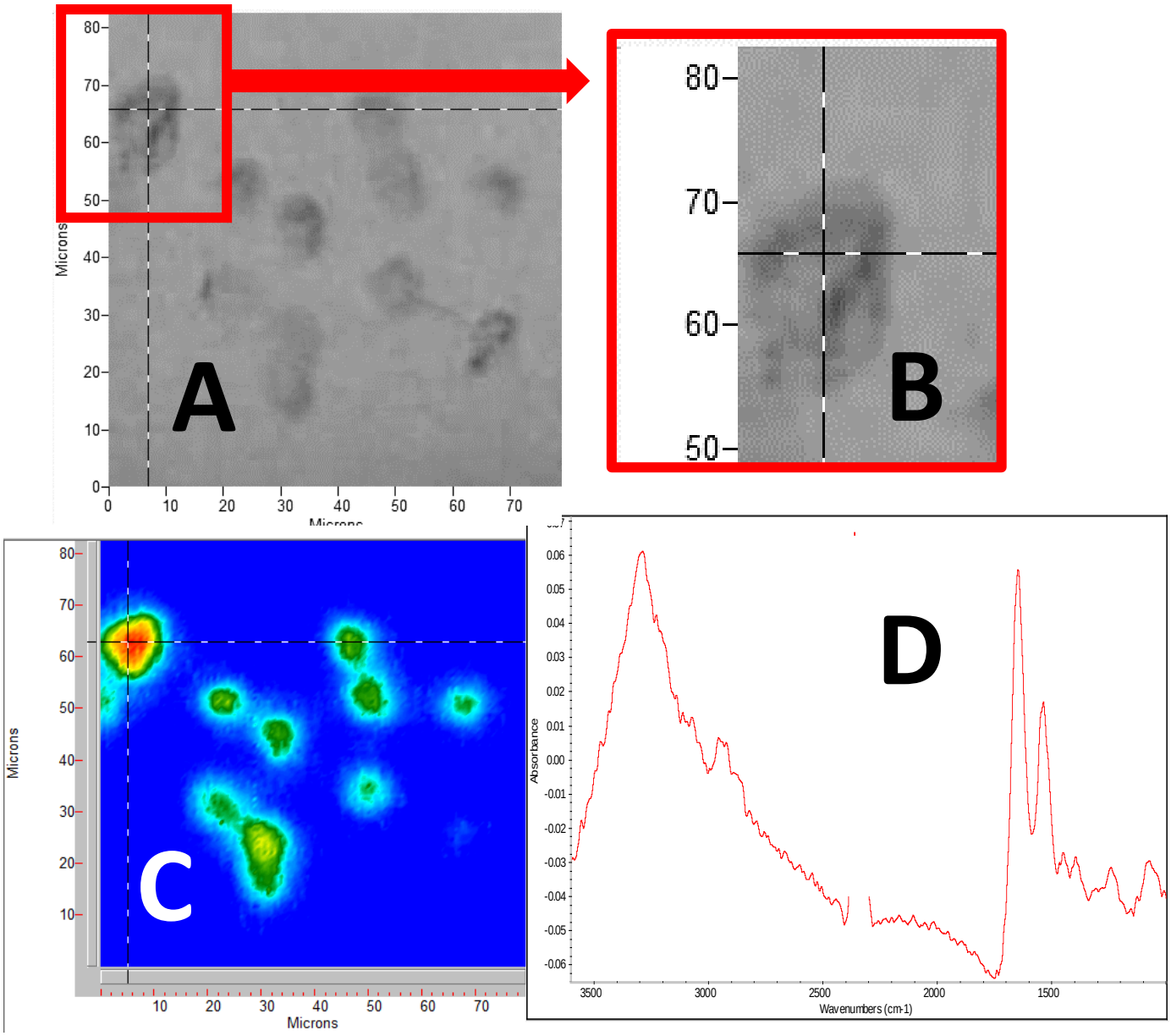


Electronic Supplementary Figure 1 A Hodgkin lymphocyte stained with Hoescht for DNA(greyscale) and with nucleolin instead of UBF for nucleoli (green) provide**s** alternative visualization of the DNA-poor regions. White arrows denote location of three large nucleoli, filled with nucleolin. White arrows with black fill denote circular DNA poor regions. A few bright points owing to random aggregates (small white arrows) are artefacts of staining. As with cells shown in Figure 1, this cell is much larger than a normal lymphocyte, and even the nucleoli are much larger than normal.



ESI Figure 2: Synchrotron FTIR image of single stripped nucleus on AuSi wafer at ALS. (**A**) The synchrotron beam at BL 2.4 was focussed on the 128x128 FPA of an Agilent 620/670, creating a single lozenge-shaped region of illumination as a result of the multiple angled mirrors by which the beam was led to the instrument. (**B**) A single stripped nucleus was steered into the beam spot for FTIR imaging. Settings: of 25x objective with additional 5x magnification optic in front of the FPA gave geometric pixel dimensions of ~700 nm x 700 nm. (**C**) the spectrochemical image based on the integrated area of the OH/NH band around 3300 cm^{-1} clearly shows that the nucleus is detectable; sum of 512 scans ratioed to background of 1024 scans. Red/blue wave pattern surrounding the cell should be ignored as it is an artefact of the unusual shape of the illumination. (**D**) A spectrum from the nucleus shows the classic hallmarks of the Electric Field Standing Wave effect which results in a significant decrease in signal with increasing wavelength (See references 23 and 24). Given the extremely thin sample, the amplitude of light probing the nucleus at longer wavelengths drops almost to zero, as expected. It is only due to the brilliance of the



ESI Figure 3. Far field FTIR (FFIR) spectrochemical image of stripped lymphocyte nuclei mounted by cytofuge at 200g onto CaF_2 window recorded with Agilent 620/670, 128x128 FPA, 25x magnification with additional 5x magnification optics in front of FPA detector. Sum of 1024 scans for background and sample. Instrument located at BL 2.4, ALD, Berkeley, but using internal thermal source.

(**A**) Visible image of cells on CaF_2 window as seen with camera installed on IR microscope. (**B**) enlargement showing point where several nuclei randomly landed in a stack. (**C**) FTIR spectrochemical image processed on integrated intensity of OH/NH band around 3300 cm^{-1}. (**D**) Strong signal shows phosphates associated with nucleic acids, but dominated by Amide I and II owing to high density of proteins within the nucleus.