Recent Advances in FTIR Spectroscopic Imaging in Transmission

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An FTIR image can be acquired mainly in three different configurations: transmission, reflection or attenuated total reflection (1). A "pseudo-hemisphere" approach was applied to FTIR imaging in transmission mode, and demonstrated increased spatial resolution along with the removal of chromatic aberration and a reduction in scattering. This has been achieved by introducing a lens on top of the window of a standard transmission infrared liquid cell, a pseudo hemisphere lens is formed on the sample and the dispersion and refraction effects are removed.(2) Through this lens refraction of light is removed and the light across the spectral range has the same focal depth. We show that this approach can be applied to image cross section of human hair, breast tissue and live cells in transmission mode without chromatic aberration and with an improvement in spatial resolution; scattering effect across the edge of cross section of tissue was also minimised with the presence of the lens. In a further development, a second set of lens to create pseudo sphere (rather than hemisphere) was introduced to obtain focused images of aqueous systems for imaging of live cells in microfabricated devices. This approach is significant as spectroscopic imaging of live cells was achieved without the recourse to a synchrotron source of infrared radiation and that FTIR images of live cells have been measured in microfluidics in aqueous solutions and in droplets.(3) This powerful approach may be beneficial for FTIR spectroscopic imaging in transmission for the study of liquid samples.

References:

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