

***Electric Field Standing Wave Effects in FT-IR Transflection Spectra of Biological Tissue Sections***

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The so-called electric field standing wave effect (EFSW) has recently been demonstrated to significantly distort FT-IR spectra acquired in a transflection mode, both experimentally and in simulated models [1,2]. These results put into question the appropriateness of the technique for sample characterization, particularly in the field of spectroscopy of biological materials. In this work [3], the model is extended to sample thicknesses more representative of biological tissue sections and to include typical experimental factors which are demonstrated to reduce the predicted effects (integration over the range of incidence angles, varying degrees of coherence of the source and inhomogeneities in sample thickness). The latter was found to have the strongest averaging effect on the spectral distortions. Whenever inhomogeneities as low as 10% of the sample thickness are present, the predicted distortions due to the standing wave effect are almost completely averaged out. As the majority of samples for biospectroscopy are prepared by cutting a cross section of tissue resulting in a high degree of thickness variation, this finding suggests that the standing wave effect should be a minor distortion in FT-IR spectroscopy. The study has important implications not only in optimization of protocols for future studies, but notably for the validity of the extensive studies which have been performed to date on tissue samples in the transflection geometry.

References:

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