

Identification and characterization of microorganisms by FT-IR microspectroscopy

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Because of the increasing prevalence of infectious diseases new, rapid, and easy to use techniques for the characterization and identification of clinically relevant micro-organisms are requested as important decision factors in clinical microbiology and therapy.

We have combined a FT-IR microscope with a FT-IR spectrometer which may provide diagnostic results within a few hours (less than 10 hours). With this method it is possible to obtain high quality IR-spectra from microbial micro-colonies containing only a few hundred cells already after 6 to 10 hours of cultivation time on nutrient agar plates using a special stamping device that transfers spatially accurate the micro-colonies from solid cultures plates to IR transparent support materials. The information accessible from the FT-IR spectra of the microbial micro-colonies (cell composition, structural data, type-specific FT-IR fingerprints) can be used as input data to differentiate and classify very divers micro-organisms. Using a computer controlled x.y-stage together with mapping and video techniques FT-IR microscopy can be used to characterize colony heterogeneity within micro-colonies and also cryo-sectioned samples of macro-colonies, which in turn enables the detection of changes of molecular composition of cells within a complex microbial and macrobial environment.