Micro-Raman spectroscopical identification of bacterial cells of the genus Staphylococcus in dependence on their cultivation conditions

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Fast and exact identification of microorganisms is becoming an important challenge in various fields of research and industry. For example, reliable and rapid methods are needed for the characterisation of relevant microorganisms in medicine, pharmaceutical production or food processing technology. Routine microbiological identification of pathogenic microorganisms is largely based on growing microbes in various media and on biochemical tests. Consequently, this procedure takes at least longer than one day. Therefore novel and fast analytical techniques are necessary, making it possible for extensive and fast identification of a single cell. Among the new methods the Fourier transform infrared spectroscopy (FT-IR) [1] and Raman spectroscopy [2] are suitable tools for the rapid identification of microbes. With these highly sensitive technicques the resulting spectrum provides the biochemical information of the molecular composition of the studied microorganisms. Spectral signals can be used to differentiate between several microbial species and strains in bulk material or micro colonies.

In this contribution we present a study of a micro-Raman spectroscopical identification of bacterial cells of *Staphylococcus cohnii*, *Staphylococcus epidermitis* and *Staphylococcus warneri*. These bacteria are relevant for pharmaceutical production in clean room environment. Micro-Raman spectra were obtained from bacterial cells grown under several cultivation conditions with respect to nutrient medium and temperature. Since variations of single bacteria [3] are more pronounced than these of bulk material a complete data set with all possible variation of cultivation condition is necessary. These spectra were used to discriminate and classify bacterial species and strains and to characterize growth dependent distributions in the biochemical compositions of bacterial cells.

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References

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