Raman-compatible inactivation of microbial spores: A protocol evaluation

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Raman spectroscopy is a powerful tool for chemical substance identification that has gained popularity within the last decade effectively. Within microbiology Raman spectroscopy is considered as a very important whole-organism fingerprinting technique, which is used to characterize, discriminate and identify microorganisms. Beside the macroscopic diagnostics by conventional Raman spectrometers, even the reproducible investigation and characterization of microbial cells or spores on the single cell level is possible due to the highly-sensitive and ultrafast scanning sample confocal Raman(micro)spectrometer available on the market today[1]. However, the formation of databases for the identification of highly pathogenic (biosafety level 3) microorganisms is hindered by the absence of a validated Raman-compatible inactivation protocol for both, vegetative cells and bacterial endospores.
The sporicidal effect of aqueous and alcoholic peracetic acid (PAA) solutions was carefully investigated and reported already in 2005[2]. It turned out that – in suspension assays –a complete inactivation of *Bacillus anthracis* spores was achieved in less than 3 min using 0.5% PAA solution. The published experimental inactivation procedure was tested with respect to their Raman compatibility for both the macroscopical (FT-Raman) and the single cell (confocal Raman microspectroscopy) approach. The protocol was evaluated for different incubation time, PAA concentrations and the addition of impact enhancers like EtOH.

References:

[1] A. Hermelink, A. Brauer; P. Lasch, D. Naumann, *The Analyst* 134, 1149-1153 (2009).
[2] H. Nattermann, S. Becker, D. Jacob, S. R. Klee, I. Schwebke, B. Appel, *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 48, 939-950 (2005).