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Streszczenie rozprawy doktorskiej p.t.: '*Surface-enhanced Raman spectroscopy as a tool for efficient detection and differentiation of pathogenic bacteria and fungi*'. (10.01.2018)

This thesis presents the experimental studies in the field of surface-enhanced Raman spectroscopy (SERS). The SERS effect is a very sensitive technique in which the Raman signal of chemical compound or biological sample under investigation can be enhanced by several orders of magnitude. Such great amplification can be obtained due to the presence of rough metal surface or metal nanostructures in close proximity to measured molecules. More precisely, this work is focused on different applications of SERS technique in biomedicine and food industry: it was shown that the technique is applicable in the detection of pathogenic bacteria in body fluids and food samples. Additionally, it was demonstrated that SERS method can be used to detect dermatophytes in the scrapings of infected human skin.

The new innovative procedures of SERS substrates preparation, which were also described in the present work, together with principal component analysis (PCA), enabled the experiments on bacteria and fungi differentiation at species level. Moreover, in the case of bacteria, namely *L. monocytogenes*, the strain- and genoserotyping were also possible.

My dissertation is composed of theoretical and experimental parts. The former (Chapters 1-7) introduces readers to the subject area and presents the aim of the thesis. Here, the key information about vibrational spectroscopy, Raman spectroscopy, and surface-enhanced Raman spectroscopy is presented. Moreover, the commonly used techniques in the field of bacteria and fungi detection and/or identification, as well as the concept of principal component analysis were described. The other, experimental part (Chapters 8-11) contains information concerning the conditions, materials and procedures applied in production of different SERS substrates and performing SERS measurements, as well as the results obtained during SERS-based experiments on complex samples containing bacterial and fungal cells. It is worth noting that the majority of the results presented in this work had been already published in the form of five scientific articles and four patent applications (for detailed information, see Chapters 13-14). At the end of each experimental section the drawn conclusions were presented. The last Chapter of the thesis (Chapter 12) is devoted to a discussion about the presented results.