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Raman spectroscopy of biofilms

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Abstract content
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In this study the chemical composition of the extracellular polymeric substance (EPS) matrix of specific biofilms was characterized non-invasively using Raman spectroscopy. Biofilms are groups of microorganisms in which cells stick to each other on a surface. These cells are usually contained within a self-produced matrix of extracellular polymeric substance (EPS). This biofilm EPS, which is often referred to as slime, is a polymeric conglomeration, composing of extracellular DNA, proteins, and polysaccharides. Biofilms may form on many different surfaces, both living and non-living, and are found in natural, industrial and even hospital settings. The microbial cells growing in a biofilm are physiologically distinct from planktonic cells of the same organism, which, by contrast, are single-cells that may float or swim in a liquid medium.

In situ Raman measurements from biofilms will be presented with tentative band assignments made. The use of silver nanoparticles for performing Surface Enhanced Raman Scattering (SERS) of compounds commonly found in the EPS of biofilms will also be shown. The nanoparticles were synthesized following established published protocols.

Measuring the chemical composition i.e. carbohydrate and protein expression in biofilms, as a function of growth conditions should lead to an improved understanding of biofilm formation. This information can be used in future treatments of potable water as well as in biofuel production.

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