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## Quantum cascade laser-based infrared spectrometer combined with small angle neutron scattering for life science applications

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Infrared spectroscopy serves as local probe reporting on specific vibrations in some side chains which are spectrally distant from the complicated infrared spectrum of a protein in solution. But it can also serve as a global probe using the coupling of the amide I or amide II vibrations of the protein backbone. Here, infrared spectroscopy can give information on the fold of the protein and also follow aggregation phenomena. Small angle neutron scattering also reports on the global structure of proteins in solution and can give information on the shape of growing aggregates or folded protein in solution. Both techniques prefer heavy, deuterated water over normal water. Pioneering work has been performed on the combination of SANS and IR spectroscopy using FTIR spectrometers by Prof. Kaneko and coworkers [1].

In the framework of a BMBF-funded project, we would like to explore the capabilities of quantum cascade laser for this combination of methods. Their advantage is superior beam characteristics and spectral density over the glow bar infrared light sources of the FTIR spectrometer. Their disadvantage is the more complicated mode of operation and the limited spectral width they can cover.

This contribution will focus on showing conceptual design considerations and first characterizations of potential samples, since the project just started recently (May 2020).

[1] Kaneko et al, Development of a Simultaneous SANS/FTIR Measuring System, Chemistry Letters, 2015, 44, 497-499

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