Seminar Speaker Series

in the framework of Interreg V-A project CAPSID

presents

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Laser-based IR spectroscopy:

A new perspective for protein secondary structure analysis

17. 12. 2020 at **14:00**

Online virtual talk via Zoom

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Organized by:

Dr. Andreas Schwaighofer

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Dr. Andreas Schwaighofer works at the department of the 'Environmental Analytics, Process Analytics and Sensors' led by Univ. Prof. Dr. Bernhard Lendl at the Institute of Chemical Technology and Analytics.

RESEARCH INTERESTS

IR spectroscopy is an excellent method for studying dynamics of protein secondary structure. However, its low sensitivity has been prohibitive for monitoring of protein refolding from inclusion bodies, which is an important step in downstream bioprocessing. Recent advancements in laser-based IR spectroscopy provided enhancement in robustness and sensitivity which are necessary for performing these measurements.

Application of quantum cascade lasers (QCLs) enables new possibilities for protein analysis by mid-infrared (mid-IR) spectroscopy. These new possibilities mainly trace back to the different properties of these sources when compared to the broadband thermal sources typically employed in Fourier-transform infrared (FTIR) spectrometers. QCL-based setups can take advantage of the high spectral power densities, and also the coherent and inherently polarized nature of the used laser sources for developing new measurement modalities. This talk provides an overview of different applications of QCLs for mid-IR spectroscopic analysis of proteins. Multiple approaches are presented for acquisition of broadband infrared spectra that are employed for qualitative and quantitative characterization of protein secondary structure and reach signal-to-noise ratios superior to established FTIR spectroscopy. Expanding the limited spectral coverage currently is a subject of intensive development. For time-resolved studies of protein kinetics, QCLs offer to selectively record kinetic traces at individual wave numbers. Finally, the unique characteristics of QCLs make it possible to implement advanced measurement schemes that promise an innovative field of research and new applications in the upcoming years.

REFERENCE

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