

THz spectroscopy of protein folding

Proteins exhibit hierarchical dynamics on many time scales, where motions (vibrations, rotations, librations) with THz frequencies can give insight on the conformational state and solvation dynamics. This project aims to study protein folding using a state-of-the-art THz spectrometer (TERA K15, Menlo Systems), see figure below. The student will prepare protein solutions (supervisor: Sellberg) of lysozyme and ribonuclease A in folded and unfolded states that are probed by THz spectroscopy (supervisor: Pasiskevicius). The spectroscopic response of the samples will be evaluated in transmission and reflection and spectroscopic signatures for the various samples will be characterized. Samples will be prepared on various substrates and scanned based on their spectroscopic signatures. A THz pump-probe scheme will be developed to selectively excite proteins in both their folded and unfolded states.

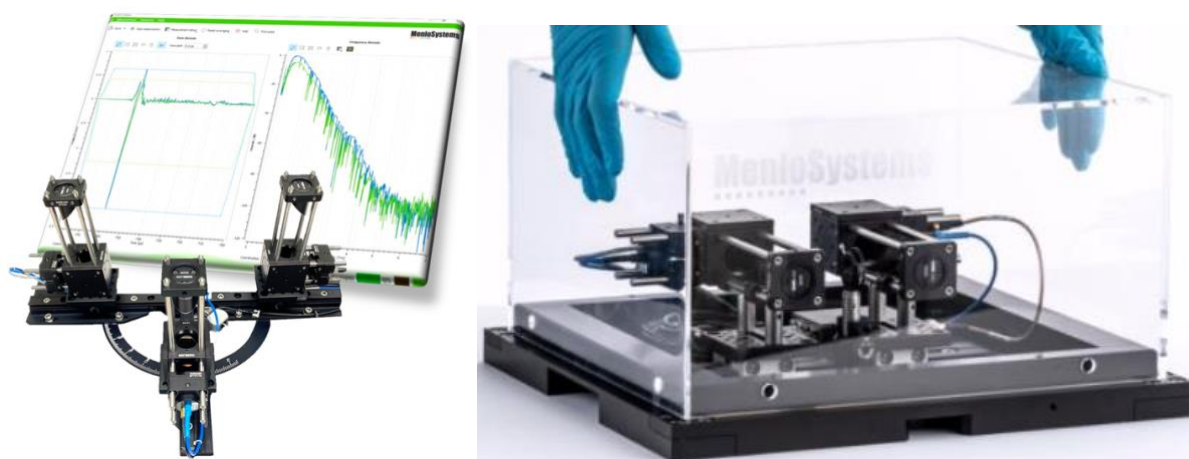


Fig. 1. Photographs of the THz spectrometer (KERA T15, Menlo Systems) with built-in software and fiber-coupled emitter and detectors in transmission and reflection geometry.

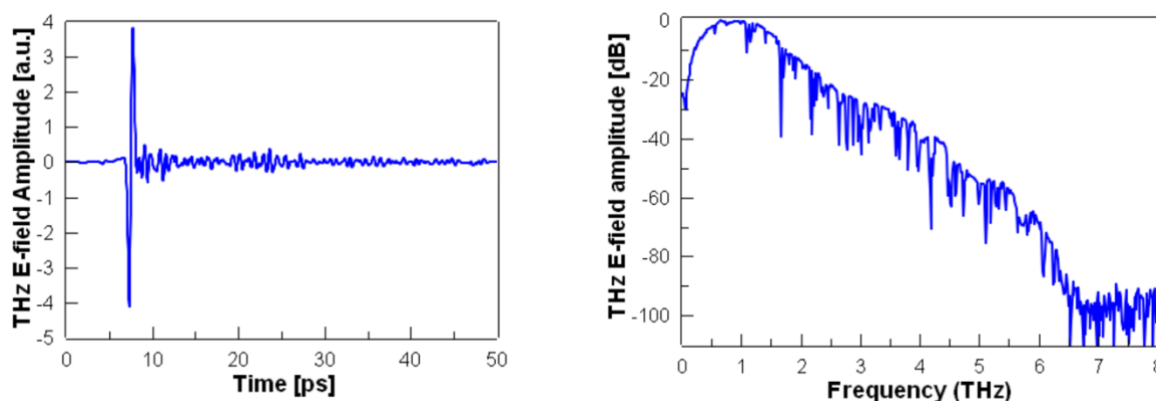


Fig. 2. Typical response in the time domain with its frequency representation (through FFT) directly accessible in the software.