

Terahertz spectroscopy of cryoprotective agents: Hydration dynamics of antifreeze proteins

Konrad Meister¹, Simon Ebbinghaus², B. P. Born¹, A. Devries⁴,
M. Gruebele^{2,3} and Martina Havenith¹

¹Lehrstuhl für Physikalische Chemie II, Ruhr-University Bochum, Germany

²Department of Physics, University of Illinois, Urbana, USA

³Department of Chemistry and Center for Biophysics and Computational Biology, University of Illinois,
Urbana, USA

⁴Department of Animal Biology, University of Illinois, Urbana, USA

Abstract:

Terahertz (THz) spectroscopy was used to investigate the collective water dynamics and dynamical hydration shell of antifreeze proteins at different temperatures.

In our previous studies we demonstrated that THz spectroscopy is a novel label-free technique to sensitively probe solvation dynamics of small peptides and sugars in water [1]. We extended our studies to larger proteins such as the highly conserved regulatory protein ubiquitin and the five helix bundle protein lambda repressor [2].

In this work we focused on biomolecules with a known antifreeze activity. Using our high power p-Germanium laser spectrometer (2.1-2.8 THz) we could show that antifreeze activity of AFGPs is directly correlated with long-range collective hydration dynamics [3].

Our recent results reveal that THz spectroscopy might give new insights and explanations on the mode of action of antifreeze proteins.

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Funding:

We gratefully acknowledge funding by the Volkswagen Foundation

