

Structure-Property Relations in Aqueous Foam and their Control on a Molecular Level

Dr. Björn Braunschweig
Friedrich-Alexander University Erlangen-Nürnberg
Institute of Particle Technology (LFG)
Cauerstrasse 4 D-91058 Erlangen; Germany

Protein and surfactant modified air–water interfaces are an important model system for colloid science as many applications for example aqueous foams in dairy products rely on our knowledge and ability to tune molecular structures at these interfaces. That is because interfaces are a fundamental building block in the hierarchical structure of foam, where in fact the molecular level can determine properties on larger length scales. For that reason it is of great importance to increase our ability to study air–water interfaces with molecular level probes and to obtain not only information on coverage but also direct information on interfacial composition, molecular order, orientations as well as information on the charged state of an interface. Vibrational sum-frequency generation (SFG) is a powerful tool that can help to address these issues. In this presentation, recent results from SFG spectroscopy for studies at biomolecule and surfactant modified aqueous interfaces will be presented. In order to guide interpretations from interface spectroscopy we invoke the use of complementary methods such as ellipsometry and zetapotential measurements of bulk molecules.

References

- K. Engelhardt, W. Peukert and B. Braunschweig; *Vibrational sum-frequency generation at protein modified air-water interfaces: Effects of molecular structure and surface charging*; Curr. Opin. Coll. Int. Sci.;19, 207-215 (2014)
- K. Engelhardt, U. Weichsel, E. Kraft, D. Segets, W. Peukert, and B. Braunschweig, *Mixed Layers of β -Lactoglobulin and SDS at Air-Water Interfaces with Tunable Intermolecular Interactions*; J. Phys. Chem. B; 118, 4098-4105 (2014)
- K. Engelhardt, M. Lexis, G. Gochev, C. Konnerth, R. Miller, N. Willenbacher, W. Peukert, and B. Braunschweig; *pH Effects on the Molecular Structure of β -Lactoglobulin Modified Air–Water Interfaces and Its Impact on Foam Rheology*; Langmuir, 2, 11646–11655 (2013)
- K. Engelhardt, A. Rumpel, J. Walter, J. Dombrowski, U. Kulozik, B. Braunschweig and W. Peukert. *Protein adsorption at the electrified air-water interface: Implications on foam stability*; Langmuir, 28, 7780–7787 (2012).