MO 59 Poster: Experimental Techniques

Zeit: Donnerstag 16:30–18:30 Raum: Labsaal

MO 59.1 Do 16:30 Labsaal

Ultrathin optical fiber absorption spectroscopy of submonolayers at ambient conditions — •Florian Warken[1], E. Vetsch[1], G. Sagué[1], D. Haubrich[1], D. Meschede[1], M. Sokolowski[2], and A. Rauschenbeutel[1] — [1]Institut für Angewandte Physik, Universität Bonn, Wegelerstr. 8, 53115 Bonn — [2]Institut für Physikalische und Theoretische Chemie, Universität Bonn, Wegelerstr. 12, 53115 Bonn

Ultrathin tapered optical fibers provide strong evanescent fields over almost unlimited length. Such fibers promise to even detect very few molecules or single atoms. In our experiment we demonstrate an extremely sensitive, simple and fast method for absorption spectroscopy of different organic molecules adsorbed at the surface of a fiber at ambient conditions. Furthermore, we are able to resolve the dynamics of agglomerating molecules while undergoing phase transition from gas to adsorbate. This results in a shift and broadening of the absorption spectrum. We discuss the potential for detection of single molecules. Furthermore the investigation of spectra in the strong coupling regime with a micro-cavity such as bottle or Fabry-Perot resonator is considered.

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Alternate Gradient Focusing and Deceleration of large molecules — •Jochen Küpper, Kirstin Wohlfart, Frank Filsinger, Hendrick L. Bethlem, Henrik Haak, and Gerard Meijer — Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin

Over the last years fascinating progress has been made in the spectroscopy of large molecules, e. g. the *building blocks of life* [1]. Such studies allow a detailed understandig of the intrinsic physical and chemical properties of large, modular molecules. The preparation of cold, isolated samples of large molecules and the manipulation of their external degrees of freedom allow further investigations using high-resolution spectroscopy or scattering experiments. Our group has been developing methods to decelerate and store neutral molecules using switched electric fields [2]. Here we show how these techniques can be applied to large molecules, i. e. molecules of biological relevance, for which all low-lying states are practically high-field seeking. Using a novel, modular experiment for the Alternate Gradient deceleration and trapping of molecules in high-field seeking states metastable CO and benzonitrile (C_7H_5N) have been decelerated. The results of these experiments are compared to simulations and further experiments on the manipulation of the external degress of freedom of benzonitrile and large, modular molecules are discussed.

[1] Special issue "'Biomolecules in the gasphase"' *Eur. Phys. J. D* **20**(3), 309–626 (2002); Special issue "'Bioactive molecules in the gasphase"' *Phys. Chem. Chem. Phys.* **6**(10), 2543–2890 (2004)
[2] H.L. Bethlem und G. Meijer, *Int. Rev. Phys. Chem.* **22**, 73–128 (2003)

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Highly sensitive absorption contrast imaging with a near-field infrared nanoscope — •Ilona Kopf, Götz Wollny, Jean-Sebastien Samson, Erik Bründermann, and Martina Havenith — Physikalische Chemie II, Ruhr-Universität Bochum

A challenging scientific task is the label-free and non-invasive investigation of molecules with a nanometer scale resolution. Due to the significant absorption lines in the infrared region, the so-called fingerprint region, the combination of sophisticated apertureless near-field scanning optical microscopy with unique infrared laser spectroscopy is a powerful method to revolutionize our understanding of the chemistry of biomembranes and surfaces. Using microcontact printing we could show that a near-field scanning infrared microscope offers a high sensitivity to chemically resolve molecular monolayers: a longstanding goal in SPM. To deepen the understanding of the chemistry of supported biomembranes additional measurements were performed on liposomes and artificial lipid bilayers with a subwavelength resolution of about 20 nm.