MO 23: Experimentelle Techniken

Zeit: Donnerstag 16:30–19:00 Raum: Poster C1

MO 23.1 Do 16:30 Poster C1

Experimenteller Aufbau zur Untersuchung des Dissoziationsprozesses von H_2^+ — •Sophie Kirschner[1], Matthias Odenweller[1], Mustafa Yildirim[2], Kyra Cole[1], Lothar Schmidt[1], Markus Schöffler[1], Lutz Foucar[1], Jasmin Titze[1], Zenghu Chang[1,3], Horst Schmidt-Böcking[1] und Reinhard Dörner[1] — [1]Institut für Kernphysik, Johann Wolfgang Goethe-Universität, Frankfurt am Main, — [2]Institute of Graduate School of Natural and Applied Sciences, Afyonkarahisar Kocatepe University, Afyonkarahisar, Turkey — [3]Department of Physics, Kansas State University, Manhattan, KS, USA

Vorgestellt wird ein Versuchsaufbau, um das Verhalten von H_2^+-Ionen unter Einwirkung starker Laserfelder zu untersuchen. Eine Adaption der renomierten COLTRIMS-Technik (COLd Target Recoil Ion Momentum Spectroscopy) erlaubt hierbei die Detektion aller beteiligten Teilchen über den vollen Raumwinkel. Mittels eines Pump-Probe-Experimentes bei verschiedenen Delays ist eine zeitaufgelöste Messung des Dissoziationsprozesses möglich.

Besondere Herausforderungen bei der technischen Umsetzung liegen in der Fokussierung des Lasers auf den Ionenstrahl.

MO 23.2 Do 16:30 Poster C1

Optimization of Nano-Structured Surfaces for Surface-Enhanced Raman Scattering (SERS) — •Malte Sackmann, Torsten Balster, Veit Wagner, and Arnulf Materny — Jacobs University Bremen, Germany

Surface-enhanced Raman scattering (SERS) in the visible spectral region is typically observed for molecules in the vicinity of nanostructured metal surfaces. Here, rough metal surfaces, metal colloid solutions (Sol) as well as metal tips cause a strong enhancement of the Raman signal. In consequence SERS is a suitable spectroscopic technique for the measurement of very low analyte concentrations.

In order to perform experiments leading to a better understanding of the enhancement effect, reproducible SERS-active substrates are required. For this purpose, we have prepared surfaces with two-dimensional gold-dot arrays on silicon by means of e-beam lithography. Different substrates were produced as grating-like arrangement of gold nano dots. In order to find the optimum enhancement, spacing, size and shape as well as the thickness of the gold layers (dot height) were varied. Raman spectra were recorded using the excitation wavelengths 514 and 671 nm resulting in a signal enhancement of up to three orders of magnitude. The SERS substrates were more efficient for the red excitation wavelength by a factor of approx. 10.

In our contribution, results of these experiments are shown and the relationship between the structure parameters and the enhancement factors are discussed. An outlook evaluating possible applications in industry and analytics is given.

MO 23.3 Do 16:30 Poster C1

Raman Spectroscopy for the Characterization of Coffee — •Rasha Hassanein, Patrice Donfack, Malte Sackmann, and Arnulf Materny — Jacobs University Bremen, Germany

Coffee is one of the most popular beverages around the world. The varieties of coffee are directly influenced by environmental conditions and by the various methods of processing especially roasting, which consequently affect the quality of coffee. The discrimination between coffee species and blends for the purpose of monitoring quality and detecting fraud is difficult, since the chemical composition of coffee varieties is complex and many parameters are influencing the quality. Therefore, it is necessary to find parameters suitable for the differentiation of coffee. Recently, we have proposed Raman spectroscopy as a possible way to characterize coffee varieties of different geographical origins and roasting degrees. This is achieved by analyzing the volatile fraction and key components of coffee. The amounts and composition of flavor precursors in green coffee have a dramatic effect on the quality of the final roasted coffee. For example, trigonelline - which is common in raw coffee beans - plays a significant role not only in forming the aroma and flavor but also since antioxidant chemicals are formed during the roasting process. We have taken Raman spectra and analyzed them in order to identify trigonelline in green coffee from different geographical regions. Additionally, we have taken spectra of vapor extractions from coffees based on freshly grounded beans as well as from instant coffee. Clear differences could be detected, which are discussed with respect to their importance in assessing the quality of coffee.

MO 23.4 Do 16:30 Poster C1

Erzeugung und Formung von ultrabreitbandigen fs-Laserpulsen im sichtbaren Spektralbereich — •Tatjana Löhrig[1,2], Florian Langhojer[1,2], Frank Dimler[1,2] und Tobias Brixner[1,2] — [1]Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg — [2]Physikalisches Institut, Universität Würzburg, Am Hubland, 97074 Würzburg

Die hier vorgestellten ultrabreitbandigen fs-Laserpulse werden mit Hilfe eines zweistufigen nichtkollinearen optisch-parametrischen Verstärkers (NOPA) erzeugt und decken den kompletten Spektralbereich von 500 nm bis 750 nm ab.

Zur Formung dieser Pulse dient ein zweischichtiges LCD mit jeweils 640 Pixeln, das sich in der Fourierebene eines Nulldispersionskompressors befindet. Die spektrale Aufspaltung der Pulse erfolgt durch holografisch geschriebene Volumenphasengitter (VPHG), die über den gesamten Spektralbereich eine hohe Effizienz aufweisen.

Zur Charakterisierung der Pulse wird ein transient grating FROG verwendet, bei dem die Phasenanpassung für alle Frequenzanteile erfüllt ist. Gezeigt werden die gemessenen FROG traces sowohl für ungeformte als auch für geformte fs-Laserpulse. Als erstes Beispiel soll die Komprimierung eines Pulses mit Hilfe eines evolutionärem Algorithmus gezeigt werden.