



# SFB1242

Nichtgleichgewichtsdynamik kondensierter  
Materie in der Zeitdomäne

UNIVERSITÄT  
DUISBURG  
ESSEN

*Open-Minded*

**17.04.2018 / 10 Uhr c.t., Raum MG 272  
Campus Duisburg**

## **Laser spectroscopic applications from physics to biology and medicine**

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Lasers have become an essential light source in spectroscopic applications due to their inherent coherence and intensity. These properties enable both time (fs) and spacial (nm) resolutions required to study materials at the nanoscopic to microscopic level and also their dynamics in femtosecond to seconds time scale. In this talk we will present various applications of laser spectroscopy, particularly vibrational spectroscopy, in physics, biology and medicine. Understanding bond specific vibrational energy redistribution and relaxation of excited molecular states and also their bond specific structural dynamics were not accessible at femtosecond time resolutions due to the inherent band width restrictions present in femtosecond laser pulses. However, in recent times, study of the third order non-linear susceptibility response of a system using stimulated Raman scattering processes leads to observation of evolution of vibrational structures in femtosecond time scales. We would show examples of energy migration and coherent oscillation of coupled vibrational modes which provide information on early time response of a molecular system on excitation. In the case of biology and medicine, we would present results of both infrared and Raman microscopic approaches to studying tissues, cell-drug interactions, and lab-on-chip applications. We demonstrate subjective classification of grade IV glioblastoma brain cancer tissues using infrared microscopy. Our study on effect of drugs on various cancer cell lines resulted in identification of propionylation which may be an indication of cancer cell death. Further, very recently we have built a lab-on-chip system for use with Raman microscopy. We demonstrate the utility in combining surface enhanced Raman with lab-on-chip to study extremely low concentration of biofluids.

**Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.**

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