

Master Thesis Projects available at the Max-Planck-Institute for Biophysical Chemistry, Göttingen

1. Optical detection of nanoparticles held in ion traps

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Size-selected nanoparticle ions in the size range of 1-10 nm are captured in an ion trap using time dependent electric fields. Optical emission in the near infrared resulting from IR laser heating as well as the heat release upon reaction with admitted background gas is used to characterize the trapping of the ions. The project concerns development of a new experimental approach to study surface reactions on nanoparticles. Goals of the project include: 1) trapping ions in the size range relevant to catalytic chemistry; that is, with masses great than 1 Mega-Dalton, as well as 2) following their motion in the ion trap optically and thereby deriving the mass-to-charge ratio of the trapped particles. The successful applicant will be interested to learn more about mass spectrometry and surface chemistry.

2. Infrared laser induced fluorescence of surface adsorbates

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A new class of infrared detectors based on superconducting nanowires allows single photon detection in the mid-infrared. The first experimental set up for experiments in physical chemistry is being set-up in the Göttingen labs. Tunable infrared lasers are used to excite surface adsorbates and the infrared dispersed fluorescence is detected. Goals of the project include: 1) direct measurement of infrared fluorescence lifetimes, 2) observation of energy transfer between adsorbate molecules, 3) determination of the homogeneous infrared line width of adsorbates. The successful applicant will be interested to learn more about infrared spectroscopy, molecular energy transfer.