Laser Seminar
NCCR MUST Seminar
29th October - 1st November, 2012

NEW!!!
Time & Location:

29th October	10:00 – 12:00	HIT H 51
30th October	17:00 – 19:30	HPV G 5
31st October	18:15 – 20:30	HPV G 5
1st November	09:00 – 11:00	HPL D 34

ETH Zurich, Hönggerberg Campus

Speaker: **Anders Nilsson**, ETH-Fast Fellow
Stanford University + SLAC National Accelerator Laboratory, Menlo Park, CA USA

Title: **X-ray and electron spectroscopy**

Abstracts:

Lecture 1: **X-ray and electron spectroscopy on surfaces, general principle**
This lecture will cover the fundamental aspects of core level spectroscopy that has been most successful to probe the geometric, electronic and dynamical properties of surfaces in an atom specific way. The spectroscopies will be differentiated in terms of creation of core holes, with x-ray photoelectron spectroscopy and x-ray absorption spectroscopy, and the decay of core holes with Auger electron spectroscopy and x-ray emission spectroscopy. The usage of polarization with synchrotron radiation to probe charge orientations will also be emphasized.

Lecture 2: **X-ray and electron spectroscopy for probing processes in catalysis**
Some of the most important pieces of information that we need to obtain in catalysis are related to the active state of the catalyst and potential intermediates during operating conditions that can provide insight into the reaction mechanism. Here examples taken from our recent studies in electrocatalysis and photoelectrocatalysis for chemical energy transformation will demonstrate the unique potential of x-ray and electron spectroscopy probing at solid-liquid interfaces.

Lecture 3: **Chemical Bonding on Surface**
The stability of the different species on the surface is the fundamental basis for understanding surface chemical reactivity and catalysis. Furthermore, the activation barriers for a dissociation process can often be related to the adsorption energy of the dissociated final products in a Brønsted-Evans-Polanyi relationship. Thereby the reactivity of various intermediates is often related to the adsorption bond strength. A considerable amount of understanding has been developed for the adsorption of simple atoms and molecules on transition metal surfaces. The nature of the surface chemical bond will be discussed based on results obtained through a combination of x-ray spectroscopy and density functional theory studies.

Lecture 4: **Ultrafast Bond Breaking on Surfaces**
To achieve a full understanding of surface chemical reactions, we need information on the dynamics of making and breaking bonds at surfaces in terms of the individual atomic and molecular forces and the motions that these forces induce during chemical change. Following real-time surface chemical transformations has always been a major goal and challenge in surface dynamics. Here the first results from studies of bond breaking at surfaces using optical pump and x-ray probe from the first x-ray laser in the world, LCLS, will be discussed. How this can be extended to other future experiments will also be addressed.

Host: **Jeroen van Bokhoven**, Heterogeneous Catalysis, ICB, D-CHAB
Ursula Keller, Ultrafast Laser Physics, D-PHYS, Direction Committee of ETH-FAST

More: www.opteth.ethz.ch/news/laser_seminar
www.nccr-must.ch/fast_centers/eth-fast/eth-fast_fellows.html

Handouts and certificate will be available for the registered participants.
Please use www.nccr-must.ch to register (direct link in the right banner)

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