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# IAP-SEMINAR

## ANNOUNCEMENT

Date: **Tuesday, 14.4.2015**  
Time: **16:00 p.m.**  
Location: **Technische Universität Wien, Institut für Angewandte Physik, E134**  
yellow tower „B“, 5<sup>th</sup> floor, Seminarraum 134A (room number DB05L03)  
1040 Wien, Wiedner Hauptstraße 8-10

Lecturer: **Ulrich Heiz**  
Technische Universität München, Catalysis Research Center, Lehrstuhl für  
Physikalische Chemie, Garching/Germany

Subject: **Clusters at surfaces: concepts for tuning their stability and activity**

Abstract: The study of size-selected clusters on surfaces has been growing into a vital research field within cluster science and catalysis since the discovery of the astonishing size-dependent activity of small gold clusters for the oxidation of CO in the late nineties. More than one decade of research in a combined effort between theory and experiment has resulted in a detailed understanding of cluster's structural, electronic, optical, and magnetic properties. Furthermore, several chemical, catalytic, and photocatalytic processes on clusters are understood on a molecular level, today. This exciting advancement was only possible by a parallel development and introduction of novel, state-of-the-art methods, both in experiment and theory. In the first part this talk strategies for optimizing cluster stability against ripening will be presented, where both, the binding of the clusters to the surface and that of the individual atoms, must be controlled. In the second part of the presentation the chemical action on size-selected cluster materials under diverse ambient conditions are presented. The origin of the size dependent reactivity is discussed using results from extended ab initio calculations. In a second example the photochemistry of size-selected Pt<sub>N</sub> clusters on CdS nanotubes, explored under ambient conditions, i.e. aqueous solution, is discussed. By soft-landing size-selected Pt clusters under UHV conditions, a novel decoration method for colloiddally synthesized CdS-nanorods is presented. Subsequently, quantum efficiencies were measured in an aqueous solution with triethanolamine (TEA) as hole scavenger under UV illumination in dependence of the average number of clusters per nanorod. Furthermore, size-dependent photocatalytic activity has been observed and is discussed within a simple model, where the cluster's level alignment with the band structure of the semiconductor is essential.

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*All interested colleagues are welcome to this seminar lecture  
(45 minutes presentation followed by discussion).*

*U. Diebold e.h.  
(Seminar-Chairperson)*

*H. Störi e.h.  
(LVA-Leiter)*