Academic Lecture

State Key Laboratory of Chemical Resource Engineering

Visualizing the Atomic-scale Structure and Dynamics on Catalyst Materials using Scanning Probe Microscopy

报告人：Prof. Jeppe V. Lauritsen (Aarhus University)

时间：2019-10-10 (周四) 上午 9:00-10:00

地点：化学工程楼A203会议室

报告简介：

I will show how we have used the scanning tunneling microscope (STM) in interplay with photoemission spectroscopy techniques (XPS, NEXAFS) to investigate three important catalyst systems. We have investigated the structure and catalytic properties of earth-abundant Co and Fe-doped Co oxide thin film grown on Au(111), which can be used for the oxygen-evolution reaction (OER) in electrochemical water splitting. Secondly, reaction pathways for deep hydrodesulfurization of refractory S-bearing molecules on the important Co-promoted MoS_2 catalysts have been revealed. Finally, for the selective catalytic reduction reaction (SCR) for NO_x pollution abatement, we have explored redox properties of well-defined VO_x/anatase-TiO_2 surfaces. For some of these studies, time-lapsed “STM movies” are used to reveal the atomistic mechanisms involved in surface diffusion and reactions. In additions, applying catalytic conditions at elevated pressure can lead to important changes in the surface structure of materials, and I will outline how such challenges can be met by ambient pressure scanning probe microscopy and XPS instrumentation.

报告人简介:

Jeppe V. Lauritsen is associate professor at the Interdisciplinary Nanoscience Center (iNANO), Aarhus University, Denmark. His research group focuses on experimental surface science, in particular for atomic-scale characterization of materials relevant for heterogeneous catalysis, energy storage and energy technology. Thanks to a grant from the European Research Council ERC and leadership in several projects funded by Danish and International sources, he has established a leading surface science laboratory that employs state-of-the-art experimental tools, such as scanning tunneling microscopy and photoemission spectroscopy. Current research efforts are within electrochemical water splitting, oxide and sulfide thin film surfaces, NO_x removal, hydrodesulfurization, Fischer-Tropsch synthesis, novel 2D material catalysts, development of ambient pressure scanning probe microscopy (AP-SPM) together with fundamental surface physics studies. He is furthermore in the management committee of the iNANO center and the Integrated Materials Research Center at Aarhus University, and he has a wide range of academic and industrial collaboration projects.

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