PAUL SCHERRER INSTITUT

PSI Colloquium

Friday, April 12, 2019, 11:15 h, WHGA/001

Bert M. Weckhuysen

Inorganic Chemistry and Catalysis, Debye institute of Nanomaterials, Utrecht University, The Netherlands

Spatial and Temporal Exploration of Heterogeneous Catalysts with Synchrotron Radiation

Heterogeneous catalysts are essential to our society as they are the workhorses to convert current and future feedstock molecules, such as natural gas, crude oil, biomass, waste and CO_2, into fuels, chemicals and materials. Solid catalysts are highly complex, porous, multi-element, multi-component materials and often hierarchically structured. Catalyst scientists are therefore confronted with a formidable challenge to fully understand the functioning of solid catalysts at work and based on this knowledge design and make new or improved materials with superior performance and overall stability. This lecture will highlight some of the recent developments in the field of catalyst characterization using synchrotron radiation to uncover the structural and functional details of solid catalysts. Attention is focused on the applications of such methods utilizing the highest spatial, chemical, and time resolution available via modern synchrotron radiation-based methods. Examples include the Fluid Catalytic Cracking process, Fischer-Tropsch Synthesis process, Methanol-to-Hydrocarbon process, Olefin polymerization as well as the Sabatier reaction. These methods are used to study heterogeneous catalysts under true working conditions and at different length scales, i.e., from the level of a reactor down to the single molecule and active site. The lecture ends with a perspective on what future instrumental developments at synchrotron radiation sources may bring to realize the dream of recording a molecular movie of a solid catalyst at high temperature and pressure.

Contact: Maarten Nachtegaal (Tel. 3056)