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Lecturer: **Prof. Dr. Regina Palkovits**, Nanostructured catalysts, Computer Science and Natural Sciences, RWTH Aachen, and Max Planck-Institut für Kohleforschung, Heterogeneous Catalysis, Mülheim a. R., Germany

Title: **From Catalyst to Process Development - Efficient Utilization of Renewable and Fossil Resources**

Abstract: Depletion of fossil fuel reservoirs together with an indispensable shift of the feedstock base towards a bio-refinery approach necessitates utilizing renewable resources on a large scale for chemicals and fuel production, and makes efficient and environmental benign technologies imperative. Therein, especially the development of suitable catalysts and reaction systems for the economic transformation of lignocellulose into value-added chemicals and potential biofuels presents a key point concerning a broad application of these alternative carbon sources. The high density of functional groups opens numerous possibilities for tailored chemical transformations to novel target molecules. With regard to catalysis, however, this over-functionalization makes high demands on catalyst and process development.

One of the major challenges with regard to the development of catalysts and processes for the efficient transformation of cellulose refers to the fact that cellulose is hardly soluble in any conventional solvent complicating utilization of solid catalysts. Ionic liquids, especially based on alkyl imidazolium salts, dissolve cellulose on a molecular level. Consequently, various attempts have been made to hydrolyse cellulose to glucose or 5-hydroxymethylfurfural (5-HMF) in ionic liquids applying mineral and organic acids or metal salts. However, separation of such reaction products from polar ionic liquids is challenging because glucose and 5-HMF are difficult to extract and not thermally stable. An alternative is the depolymerization of cellulose to cello-oligomers in ionic liquids catalyzed by acidic ion exchange resins or via slow addition of conventional molecular acids. ...

Concerning the direct transformation of cellulose or sugars into potential platform molecules, not only separation of such products from ionic liquids, but also selectivity to certain target molecules becomes an issue. In addition to hydrolysis of cellulose to glucose and further dehydration to 5-HMF, re-hydration to levulinic acid or formation of humins via polymerization reactions occur. Reactive extraction presents an approach to address both issues separation and selectivity. ...

Another promising technology for future bio-refinery concepts presents hydrogenolysis resulting in C-C and C-O cleavage by hydrogen. This reaction is currently discussed intensively in the transformation of glycerol towards ethylene and propylene glycol, and exhibits high potential with regard to the conversion of further biomass derived polyols, such as sugars or sugar alcohols. Moreover, even the direct conversion of biopolymers, including not only starch but also cellulose and even lignin towards valuable platform chemicals appears possible. ...

Date: **Wednesday, November 16, 2011**

Time: **5:15 pm - around 6:45 pm**

Location: **TU Berlin; Institute of Chemistry
Straße des 17. Juni 115; 10623 Berlin
Building C; Lecture Hall C 243**

Organiser: **Prof. Schlögl (FHI), Silvia Reiche (BIG-NSE)**

Coffee and tea will be served thirty minutes prior to the lecture start.

Guests are cordially invited to attend!

Prof. Dr. Matthias Driess, Chair of the Cluster of Excellence Unicat