

UniCat Colloquium

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Lecturer: **Prof. Christina Roth**, Institute of Chemistry and Biochemistry - Physical and Theoretical Chemistry, Freie Universität Berlin

Title: ***Methods and materials development for electrochemical energy technologies***

Abstract: With dwindling fossil fuel resources and growing environmental concerns in the immediate past, clean and efficient energy conversion and storage technologies attracted increasing public attention. Numerous research efforts focused on lithium ion batteries, redox flow batteries and low and high temperature fuel cells. However, despite the recent interest, these systems still do not seem fit to compete with the existing technologies. This appears to be mainly due to the not yet completely understood reaction mechanisms as well as to the significant degradation phenomena observed in the applied catalysts. The former issue is tackled by sophisticated *in situ* methods, which help to unravel processes at the electrochemical interface in great detail. The latter shortcoming is addressed by materials design taking into account not only chemical, but also engineering and materials science aspects.

The first part of this talk is dedicated to methodical developments: *In situ* X-ray absorption spectroscopy (XAS) is used to elucidate the interaction of H₂O and CO on the Pt surface in an operating, reformat gas fed phosphoric acid fuel cell at 180 °C. For redox flow battery applications, X-ray Raman spectroscopy (XRS) is applied to allow for the *in situ* study of low Z elements in a realistic environment. The second part will focus on materials developments: shape-selected Pt nanoparticles and several oxide supports were applied in polymer electrolyte fuel cells for the first time. Electron-conducting polymers and oxides are promising alternative materials to substitute the carbon support which is extremely prone to corrosion. However, while polymers and oxides are suitable from a chemical point of view, they tend to form dense electrode layers, which cannot be penetrated by the reaction educts and products. In the future, tailored support morphologies, such as hollow spheres by templating and ultrasonic spray pyrolysis, as well as 3D structured electrodes by electrospinning and layer-by-layer assembly will therefore become more and more important. Find more about Prof. Roth on her website:

<http://www.chemie.fu-berlin.de/cgi-bin/personen?Christina+Roth>

Date: **Wednesday, November 14th, 2012 at 5:15 pm**

Location: **TU Berlin, Department of Chemistry
Straße des 17. Juni 115, 10623 Berlin
Building C, Lecture Hall C 264**

Organiser: **Prof. Peter Strasser (TUB)**

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