Group of Catalysis for Biofuels
Adj. Prof. Oliver Kröcher

http://gcb.epfl.ch
oliver.krocher@epfl.ch

General area(s)
Renewable Energy

Research themes
The GCB, which works together with the Bioenergy and Catalysis Laboratory at the Paul Scherrer Institut, targets the production of liquid biofuels by thermochemical and catalytic routes from naturally grown and mass-produced biomass, agriculture and forestry residues, and organic-rich wastes. Starting with synthesis gas/producer gas from biomass gasification, we develop highly efficient catalytic processes to liquid biofuels or fuel additives/blends. Since the availability of biomass is limited, optimum use of this valuable resource for liquid fuel production is mandatory. One approach to reach this goal is to exploit the natural oxygen content of biomass by producing oxygen-containing biofuels with an added value compared to traditional fuels.

Methodology of work / instrumentation
The majority of the projects involve the synthesis of novel catalytic materials for the production of gaseous and liquid biofuels and chemicals. Advanced physico-chemical characterization methods are applied to understand the catalyst’s structure and its correlation with the catalytic performance, e.g. surface area measurements, X-ray diffraction, high resolution transmission and scanning electron microscopy, temperature programmed oxidation/reduction/desorption, Fourier Transform Infrared Spectroscopy, X-ray diffraction and X-ray Absorption Spectroscopy. The catalytic studies and characterization are conducted under reaction conditions (in-situ and operando) for a better understanding of the catalytic processes, which allow their further optimization.

Examples of MSc / PhD theses
• M. Mehring, “Composition and reactivity analysis of diesel soot with advanced FTIR spectroscopy and a new TG-FTIR system, at the example of the oxidation with O₂, NO₂ and H₂SO₄ and the SCR reaction with NOₓ and NH₃”, Ph.D. Thesis No. 19993, ETH Zurich, 2011.