



Associate Prof. Uwe Burghaus

Post-Doctoral Fellow – UC Santa Barbara; Genoa (Italy); Bochum (Germany).
Ph. D. – Free University of Berlin, Germany.

Office: 202 LADD Hall. Ph: 701-231-9742. e-Mail: uwe.burghaus@ndsu.edu
Homepage: www.uweburghaus.de

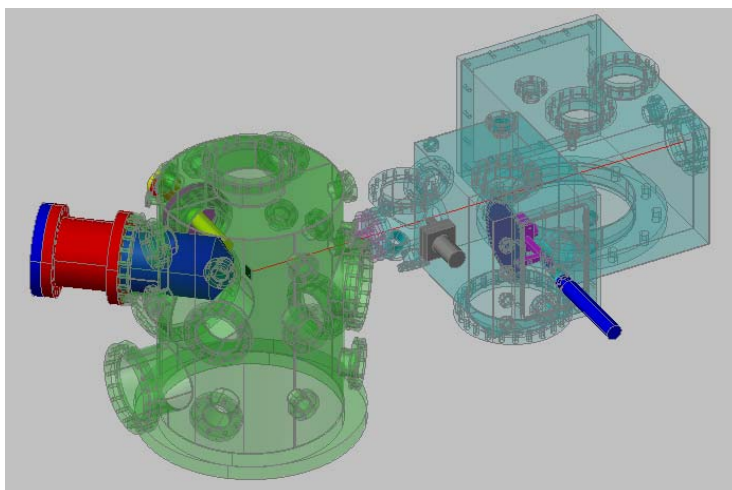
Research Highlights

If one combines the keywords “chemistry” and “surfaces” then it is clear what we are interested in. We study **chemical processes on surfaces** which includes projects as disparate as water adsorption on simulated moon dust samples and chemical reactions inside of carbon nanotubes. We focus on **energy-related projects** such as fuel cell catalysts, novel nanocatalysts, systems relevant for the next generation of solar cells, CO₂ chemistry, etc. Currently funded projects include studies on metal **nanoclusters** (NSF CAREER), nano-desulfurization catalysis (DoE), and projects on alkaline earth oxides (DoE-EPSCoR). Most of these systems are related to well-known large scale industrial processes which, however, still present interesting scientific challenges when it comes to obtaining a mechanistic **understanding** at the **molecular level**. The workhorse of our group is a molecular beam scattering system (see Fig.). Molecular beams may be compared to LASERS, but we use “real” particles, such as CO₂, alkanes, and water. In addition, the catalysts are characterized using kinetics and spectroscopic techniques. We just obtained funding (DoE supplemental) to add another tool to the lab: X-ray photoelectron spectroscopy. Every other year, a surface chemistry, **nanoscience**, and materials **class** is offered to graduate/undergraduate students providing all the details of surface chemistry techniques and related theory.



Research Interests:

- Surface science
- Heterogeneous catalysis
- Nanoscience
- Materials science



Selected Publications

- ✚ **Unexpected bond activation of small organic molecules on a metal oxide - butane/CaO(100), *Chemical Communications* (2008) 4073-4075**, by E. Kadossov, U. Burghaus
[10.1039/b804472d](https://doi.org/10.1039/b804472d)
- ✚ **Unexpected adsorption of oxygen on TiO₂ nanotube arrays - influence of crystal structure, *Nano Letters* 7 (2007) 1091-1094**, by S. Funk, B. Hokkanen, U. Burghaus, A. Ghicov, P. Schmuki
[dx.doi.org/10.1021/nl062797j](https://doi.org/10.1021/nl062797j)
- ✚ **Stabilization of polar ZnO-surfaces: Validating microscopic models by using CO as a probe molecule, *Physical Review Letters* 90 (2003) 106102-106102-4**, by V. Staemmler, K. Fink, B. Meyer, D. Marx, M. Kunat, S. Gil Girol, U. Burghaus, Ch. Wöll
[DOI: 10.1103/PhysRevLett.90.106102](https://doi.org/10.1103/PhysRevLett.90.106102)
- ✚ **Surface science perspective of carbon dioxide chemistry - adsorption kinetics and dynamics of CO₂ on selected model surfaces, *Catalysis Today* 148 (2009) 212-220**, by U. Burghaus
[doi:10.1016/j.cattod.2009.07.082](https://doi.org/10.1016/j.cattod.2009.07.082)