

Universität Bayreuth, Bayreuth, Germany (UBAY)

Expertise and Experience

The University of Bayreuth and the Federal Ministry of Environment agreed in 2002 with the Fraunhofer-Society to adopt the Department of Biophysical Chemistry at Hannover and to transfer all equipment and know-how to Bayreuth, where new laboratories have been constructed to accommodate the smog chamber technique for studies of heterogeneous atmospheric aerosol photochemistry. Present activities of the department are OH-induced degradation of aromatics in the gas phase (studied by flash photolysis/resonance fluorescence), heterogeneous and aqueous-phase photochemistry of sea-spray aerosol, halogen activation and the formation of SOA (secondary organic aerosol) from the reaction of VOCs (volatile organic compounds) studied by aerosol simulation chambers and atmospheric chemistry of volatile and semi-volatile, aerosol-borne compounds, such as brominated flame retardants, POPs and pesticides. Filter samples of coated aerosol particles were exposed in simplified photochemical experiments.

Professional Experience

Prof. Cornelius Zetzsch has a background in physical chemistry, gas kinetics and photochemistry. He received his PhD at the University of Göttingen in 1971, moved to the University of Bochum to complete the habilitation in 1978. He became active in contract research in atmospheric chemistry and joined the Fraunhofer-Society in 1983. He continued teaching as an external faculty member (professorship from 1988 at the University of Bochum) and received the Joseph-von-Fraunhofer award in 1989 for the development of the aerosol smog chamber technique. In 2003 he moved to the University of Bayreuth, founding a Research Centre for Atmospheric Chemistry. Special experience related to the present proposal stems from the investigation of heterogeneous reactions, activating halogens in sea-spray (using droplet train and wetted-wall flow tube reactors), from recent studies of particle formation in the aerosol smog chamber and from photochemical studies of pesticides in aqueous solution, to determine quantum yields of direct photolysis and OH-rate constants (using a filtered Xe lamp as solar simulator, irradiating cuvettes in a thermostated merry-go-round apparatus). In the area of heterogeneous atmospheric chemistry, the laboratory has contributed to subprojects LACTOZ and HALIPP in the EUREKA umbrella EUROTRAC and CMD and PROCLOUD within EUROTRAC-2.

RECENT/CURRENT EC PROJECTS

- CLORINAX Heterogeneous reactions of inorganic chlorinated compounds on aqueous surfaces (EV5V-CT93-0324)
- CYTROXA Cycling of OH and HO₂ by NO_x in the tropospheric oxidation of aromatics (EV5V-CT93-0309), coordinator
- DOMAC DMS: Oxidation mechanisms in relation to aerosols and climate (ENV4-CT97-0410)
- EL CID Evaluation of the Climatic Impact of Dimethyl Sulphide (ENVK2-CT-1999-00033)

EXACT	Effects of the oxidation of aromatic compounds in the troposphere (EVKCT-1999-00053)
HALOBUD	An Investigation of the Tropospheric Budget of Halogenated Compounds (ENV4-CT97-0393)
HAMLET	Halogens in the Marine Environment: Laboratory Investigations of Heterogeneous Chemistry (ENV4-CT97-0394)
MOST	Multiphase chemistry of Oxygenated Species in the Troposphere (ENK2-CT-2001-00114)
SALT	Sea-salt Aerosols: Laboratory Investigations of Heterogeneous Halogen Activation in the Troposphere (ENV4-CT95-0037), coordinator
UNARO	Uptake and Nitration of Aromatics (ENV4-CT97-0411)

RECENT PUBLICATIONS (see <http://www.bayceer.uni-bayreuth.de/atchem/en/>)

- Alebic-Juretic, A., Zetzsch, C., Doka, O., Bicanic, D. (2003) Photoacoustic study of airborne and model aerosols, *Rev. Sci. Instrum.* **74**, 503-505.
- Barcellos da Rosa, M., Krüger, H.-U., Thomas, S., Zetzsch, C. (2003) Photolytic debromination and degradation of decabromodiphenyl ether, an exploratory study in toluene, *Fresenius Environ. Bull.* **12**, 940-945.
- Barcellos da Rosa, M., Behnke, W., Zetzsch, C. (2003) Study of the heterogeneous reaction of O₃ with CH₃SCH₃ using the wetted-wall flowtube technique, *Atmos. Chem. Phys.* **3**, 1665-1673.
- Behnke, W., Görlitz, B., Palm, W.-U., Zetzsch, C. (2001) Production, sinks and mutagenicity of nitrophenols in the atmosphere. In: *Relationships between acute and chronic effects of air pollution* (eds. U. Heinrich and U. Mohr), pp. 333-337, ILSI Press, Washington, D.C. (USA).
- Behnke, W., Zetzsch, C. (2005) Formation of organohalogen compounds from heterogeneous atmospheric chemistry simulated in an aerosol smog chamber facility, *GDCh-Monograph* **34**, 110-121.
- Franklin, J., Atkinson, R., Howard, P.H., Orlando, J.J., Seigneur, C., Wallington, T.J., Zetzsch, C. (2000) Quantitative determination of persistence in air. In: *Criteria for Persistence and Long-Range Transport of Chemicals in the Environment* (ed. G. Klecka et al.), pp.7-62, SETAC, Pensacola, FL (USA).
- Geller, A.M., Krüger, U., Liu, Q., Zetzsch, C., Elend, M., Preiss, A. (2008) Quantitative ¹H NMR-analysis of technical octabrominated diphenylether DE-79 and UV spectra of its components and photolytic transformation products, *Chemosphere* **73**, 44-52.
- Hoffmann, T., Zetzsch, C., Rossi, M. J. (2007) Chemie von Aerosolen, *Chemie in unserer Zeit* **41**, 232-246.
- Koch, R., Knispel, R., Elend, M., Siese, M., Zetzsch, C. (2007) Consecutive reactions of aromatic-OH adducts with NO, NO₂ and O₂: benzene, naphthalene, toluene, m- and p-xylene, hexamethylbenzene, phenol, m-cresol and aniline, *Atmos. Chem. Phys.* **7**, 2057-2071.
- Lammel, G., Zetzsch, C. (2007) POPs – schwer abbaubare Chemikalien, *Chemie in unserer Zeit* **41**, 276-284.
- Nieto, L.I., Net, S., Gligorovski, S., Zetzsch, C., Jammoul, A., D'Anna, B., George, C. (2008) Interactions of ozone with organic surface films in the presence of simulated sunlight: Impact on wettability of aerosols, *Phys. Chem. Chem. Phys.* **10**, 2964-2971.
- Nieto, L.I., Gligorovski, S., Romano, R., Della Védova, C., Zetzsch, C. (2009) UV absorption cross-sections of a series of vinyl ethers, *Journal of Photochemistry and Photobiology A* **204**, 46-51.

- Ofner, J., Krüger, U., Zetzsch, C., Grothe, H. (2009) Direct deposition of aerosol particles on an ATR crystal for FTIR spectroscopy using an electrostatic precipitator, *Aerosol Science and Technology* **43(8)**, 794-798.
- Scheringer, M., Fiedler, H., Suzuki, N., Holoubek, I., Zetzsch, C., Bergmann, A. (2006) Initiative for an international panel on chemical pollution (IPCP), *Environ. Sci. Pollut. Res.* **13**, 432-434.
- Sen, A., Siekmann, F., Krüger, U., Zetzsch, C. (2006) Investigation of atmospheric nanoparticles: Impact of sea salt and fate of organic molecules adsorbed on alumina, *Phys. stat. sol.* **243**, 3546-3550.
- Wilhelm, P., Zetzsch, C., Stephan, D. (2006) Titania coated silica nano-spheres as catalyst in the photodegradation of hydrocarbons, *Colloid Polym. Sci.* **133**, 147-151.