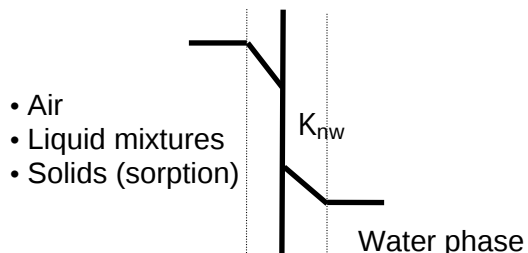


## Phase-transfer Processes at Aqueous Interfaces (Prof. Dr. Torsten Schmidt)

Diffusive layers

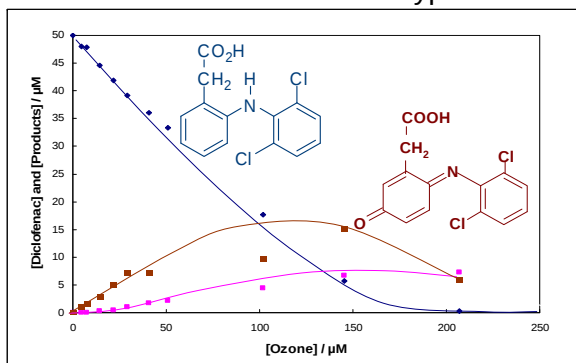


- Air
- Liquid mixtures
- Solids (sorption)

- Equilibrium partitioning (incl. modelling)
- Fundamental mechanisms, e.g., of sorption
- Kinetics of phase transfer

## Advanced Oxidation Processes (Dr. Myint Sein)

- Fundamental concepts in advanced oxidation processes such as peroxone, Fenton and nonthermal plasmas
- Kinetics, product formation and reaction mechanisms in the removal of micropollutants from raw and wastewater
- Formation of oxidation byproducts



## SELECTED PUBLICATIONS

M. Blessing, M. A. Jochmann, T. C. Schmidt: Pitfalls in Compound-Specific Isotope Analysis of Environmental Samples. *Anal. Bioanal. Chem.* 390 (2) (2008), 591-603

M. M. Sein, A. Golloch, T. C. Schmidt, C. von Sonntag: No Marked Kinetic Isotope Effect in the Peroxone ( $\text{H}_2\text{O}_2/\text{D}_2\text{O}_2 + \text{O}_3$ ) Reaction – Mechanistic Consequences. *ChemPhysChem* 8 (9) (2007), 2065-2067

E. Bi, T. C. Schmidt, S. B. Haderlein: Sorption of heterocyclic organic compounds to reference soils studied by soil column chromatography. *Environ. Sci. Technol.* 40 (2006), 5962-5970

M. A. Jochmann, M. P. Kmiecik, T. C. Schmidt: Solid-phase dynamic extraction for the enrichment of polar volatile organic compounds from water. *J. Chromatogr. A* 1115 (2006), 208-216

## TEACHING

- Analytical Chemistry
- Statistics and Chemometrics
- Water Chemistry and Analysis
- Hydrochemical System Modelling
- Stable Isotope Analysis
- Quality Management

## CONTACTS

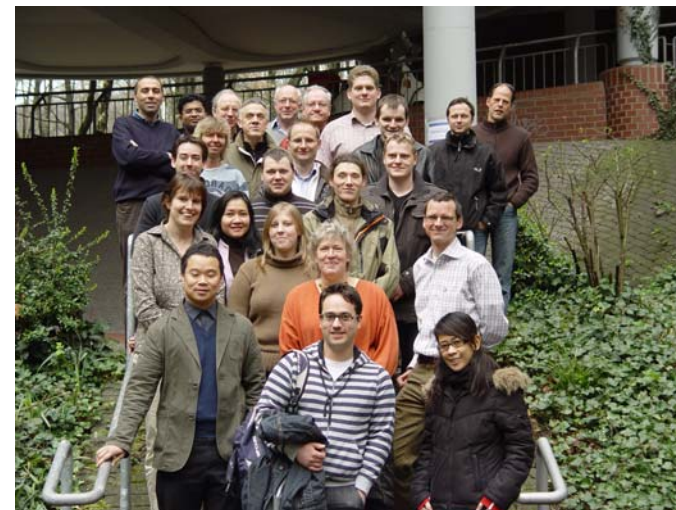
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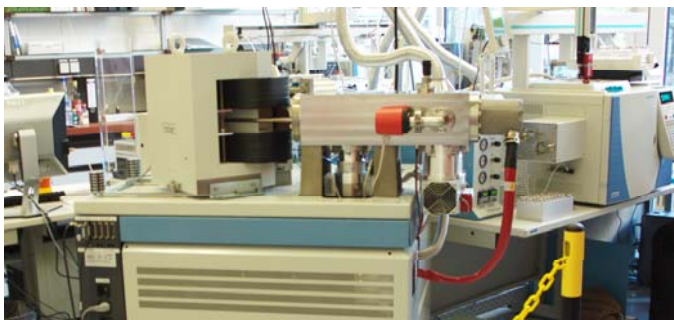


# Instrumental Analytical Chemistry



## RESEARCH AREAS

### Stable Isotope Analysis (Dr. Maik Jochmann/ Prof. Dr. Torsten Schmidt)



There is an increasing interest to utilize CSIA in environmental research. Successful applications to date include (i) the allocation of compound sources on a local, regional and global scale, (ii) the identification and quantification of (bio)transformation reactions on scales ranging from batch experiments to contaminated field sites, and (iii) the characterization of elementary reaction mechanisms that govern product formation.

The IAC Stable Isotope Laboratory was established in 2007 with the acquisition of two isotope mass spectrometers (MAT 253 and DeltaV) plus necessary peripherals to carry out automated compound-specific isotope analyses (CSIA) after either GC or LC separation. To facilitate qualitative and quantitative analysis of investigated compounds a new GC-MS Trace Ultra+DSQ2 with the same peripherals complements the equipment.

### Molecular Spectroscopy (Prof. Dr. Karl Molt)

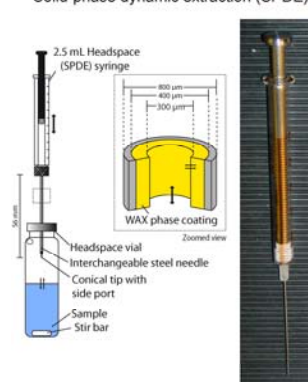


Near Infrared (NIR) and Fourier-Transform Infrared Spectroscopy (FTIR) are the mainstream techniques of PAT (Process Analytical Technology). Strongly encouraged by the FDA, PAT has become a major driving force for improving quality in chemical and pharmaceutical industry in the recent years. In this context we develop new IR/NIR-methods in cooperation with industry. Further we do research in the area of those chemometric and statistical methods, which are essential for establishing PAT in the field.

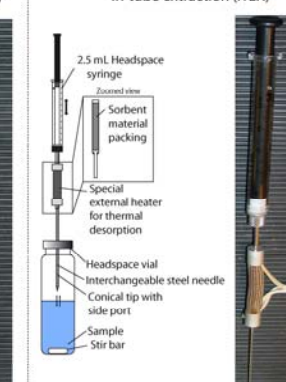
### Microextraction Techniques (Dr. Maik Jochmann)

During the last 15 years different solventless microextraction techniques were developed. In our group we focus on the development of methods and applications, which base on in-tube or in-needle extraction approaches. So far, in-tube extraction (ITEX) and solid-phase dynamic extraction (SPDE) were evaluated for the extraction of polar volatile organic compounds (PVOC) such as alcohols and ethers from aqueous matrices.

Solid-phase dynamic extraction (SPDE)

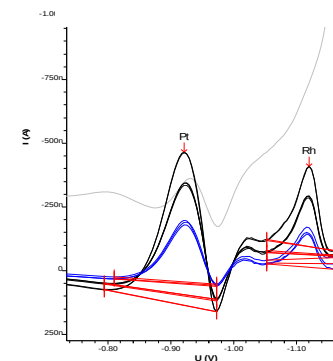


In-tube extraction (ITEX)



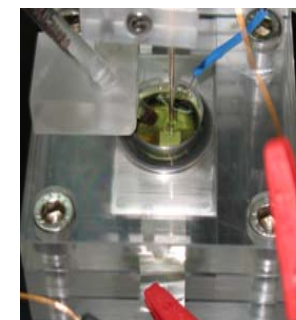
### Electroanalysis / -chemistry (Dr. Holger Krohn / Dr. Bernd Wermeckes)

#### Adsorptive stripping voltammetry at mercury electrodes



Noble metals in the  
ng/L range

#### Scanning electrochemical microscopy (SECM)



Electrodeposited  
layer of polyacryl-  
nitrile on steel

### Ion Mobility Spectrometry (PD Dr. Ursula Telgheder)

Development and applications of sample-introduction systems coupled to ion-mobility spectrometry (IMS and FAIMS/DMS) for the rapid determination of contaminants in water samples.

