Research group

Environmental Analytical Chemistry

Infrastructure

To gain more detailed insights into the chemical characteristics of the environment, a number of state-of-the-art analytical-chemical techniques, including spectro-photometric, ultra-high resolution mass spectrometric and chromatographic methods are used in our laboratory. Changes in the chemical composition of various matrices due to oxidation and photo-oxidative reactions are investigated, and the corresponding changes in the environment and toxicity of some chemical compounds are explored. The laboratory is well-equipped for the study of various systems with applications to pollution control. Instrumentation for chemical analyses includes ion-chromatographs, organic carbon analyzer, high-pressure liquid chromatographs, and gas chromatographs with MS or FID detectors. These facilities permit studies of the dynamics of various chemicals in a quartz tube reactor with long path length. Instrumentation available for field investigations includes optical particle counters, electrical aerosol analyzers, condensation nuclei counter, low-pressure impactor which can fractionate particles for chemical analysis in size ranges down to 0.02 micron, aerosol generator, and a size classifier for the submicron range. The existing infrastructure allows as well initiation of studies for identification of the human exposure pathways to selected persistent organic contaminants, while later the relationships between the investigated toxic compounds and their metabolites might also be assessed. Therefore, important contributions on the human toxicity of the targeted analytes will be evidenced. The final goal of our research interest is the development of useful design relationships for the investigated systems based on theory and experiment. Computation facilities and data acquisition systems are also available.

Equipments list (selective)

- Flame Atomic Absorption Spectrometer, Nova AA350-Analytik Jena
- Polarographic stand – TraceLab, Radiometer MDE-150 Radelkis Copenhagen
- Tubidimeter, WTW-TURB-555-IR
- High Resolution Atomic Absorption Spectrometer, ContrAA 700 Analytik Jena
- Total organic/nitrogen content analyzer, Multi N/C 3100 Analytik Jena
- Furnace, Nabertherm, More than 30 - 3000C heat
- Centrifuge, Hettich Universal 320R Zentrifugen
- HPLC, Agilent 1100 Series
- Ion Chromatograph, Dionex 3000
- UV -vis spectrophotometer, Analytik Jena Specord 210 Plus
- Spectrofluorimeter, Edinburgh Instruments Xe 900
- IR- VCD spectrometer, Chiral IR- 2X BioTools
- Organic carbon and elemental carbon analyzer, SUNSET Laboratory
- FT-IR spectrophotometer with RAMAN unit FT-IR Vertex 70 coupled RAMAN II mode Bruker
- SEM - Scanning electronic microscope with X -ray detection, Quanta 250, FEI
- Analytical balance (with 4 digits)
- Analytical Balance Sartorius CPA 26P - OCE (with 6 digits)
- Microanalytical Balance Sartorius MSU 2 7S (with 7 digits)
- Reaction chamber - capacity of 780 L equipped with a White cell with an optical IR path length of 492 m coupled to a FT –IR spectrometer, Vertex 80, Bruker

- NO/NO2 Analyzer, NOx Ecotech EC 9841 series
- O3 Analyzer, O3 Ecotech EC 9810 series
- SO2 Analyzer, SO2 Ecotech EC 9850 series
- CO Analyzer, CO Ecotech EC 9830 series
- CO2 Analyzer, Ecotech EC 9820 series CO2
- Ozone Generator, Ecotech gang 1100TS
- SMPS Particle Analyzer, TSI Electrostatic Classifier (3080) Condensation Particle Counter + (M3787)
- Mass Spectrometer with proton transfer, PTR IC-TOF -MS, Kore Technologies Limited, TOF - ionization mass spectrometer proton
- Chemical analysis of aerosol spectrometer HR-ToF-AMS, Aerodyne Research Inc. AMS. Aerodyne Aerosol Mass Spectrometer HR- ToF
- Chromatograph with flame ionization detector and thermal desorption GC-FID-MS (Turbo) TDSG-TDSA, 7890 GC System coupled with 240 Ion Trap Mass Spectrometer GC/MS system from Agilent Technologies and TDSG Gerstel thermal desorption unit
- GCxGC chromatograph with MS and FID detectors, GC System 7890 two-dimensional chromatography coupled with mass spectrometer 5975C inert XL EI/CI MSD with Triple Axis Detector
- Gas chromatograph with electron capture detector KONIK HRGC 4000B.
- Thermal system coupled with FTIR spectrometer, STA 449 F3 Jupiter thermal system (Netzsch) coupled to a Tensor 27 FT-IR spectrometer (Bruker) via a type TGA -IR (Bruker)
- Liquid chromatograph with mass detector, LC 1260 Infinity 6224 mass spectrometer coupled with TOF/LC/MS, Agilent Technologies
- Liquid chromatograph with both diode array and fluorescent detectors, 1290 Infinity LC, Agilent Technologies
- Liquid chromatography coupled with inductively coupled plasma mass spectrometer, 7700 ICP-MS coupled with Infinity LC 1260 Series, Agilent Technologies
- Ion chromatograph, ICS 5000 Dionex model, dual channel, conductivity
- Ultra-distilled water production equipment, Millipore, Milli -Q Advantage A20