

October 15, 2007

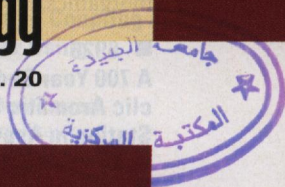
# ENVIRONMENTAL Science & Technology

<http://pubs.acs.org/est>

**Tracing Andean  
GLACIER MELT with  
Stable Isotopes in Water**

**PBDE Flame Retardants in the**





## News and Features

### 6878 Letters

Biodiesel concerns • New source performance standards for greenhouse gases

## NEWS

### 6880 Peru's glacier meltdown threatens water supplies

Scientists are looking for ways to predict local water shortages for farms and towns that rely on glaciers.

### 6881 Are people's PBDE uptake patterns changing?

Researchers don't know why the PBDE uptake patterns in Spanish infants' placentas resemble those from electronics-recycling workers—and not those of their parents' blood.

### 6881-6883 News Briefs

Saving energy at DOE • Food and fuel from crops • Sea ice hits new low • Cap and trade trumps CAFE standards

### 6882 Advancing water-quality credit trading

The U.S. EPA releases a trading "toolkit" to encourage permitting for local water-quality credits.

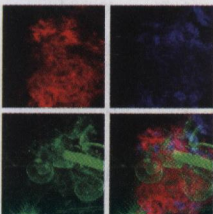
### 6883 Environmental costs of shipping

A new life-cycle analysis of freight transportation suggests that policy makers should examine all of the emissions associated with shipping goods.

## FEATURE

### ■ 6885 X-ray Spectromicroscopy—A Tool for Environmental Sciences

Jürgen Thieme, Ian McNulty, Stefan Vogt, and David Paterson



X-ray spectromicroscopy is a powerful tool for addressing key questions in the environmental sciences, because of its high spectral and spatial resolution. To define the most important problems and research directions in environmental science for which X-ray spectromicroscopy methods could be indispensable and could have the greatest impact, an all-

day workshop was held on May 4, 2006, at Argonne National

## Research

## CRITICAL REVIEW

### 6891

### Proteomics for the Analysis of Environmental Stress Responses in Organisms

Victor J. Nesatyy and Marc J.-F. Suter

Recent advances in the field of proteomics are highlighted that help researchers to identify novel biomarkers in environmental toxicology and to understand toxic modes of action.

## POLICY ANALYSIS

### ■ 6901

### Identification of Recycled Water with an Empirically Derived Symbol Increases Its Probability of Use

Konstantinos P. Tsagarakis, Robert C. Mellon, Elli Stamataki, and Erofilii Kounalaki

An experimental analysis is presented to gauge the efficacy of an empirically derived symbol for identifying sources of recycled water on potential consumers' intentions to use recycled water products.

## CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

### ■ 6909

### The Atmospheric Background of Perfluorocarbon Compounds Used as Tracers

Thomas B. Watson, Richard Wilke, Russell N. Dietz, John Heiser, and Paul Kalb

The atmospheric concentrations of perfluorocarbon tracer compounds are in the low-parts-per-quadrillion range and are increasing at <1 ppq by volume per year.

### ■ 6914

### Unsaturated Zone Arsenic Distribution and Implications for Groundwater Contamination

Robert C. Reedy, Bridget R. Scanlon, Jean-Philippe Nicot, and J. Andrew Tachovsky

Unsaturated zone studies indicate that anthropogenic arsenic applications, an output in the Southern High Plains area



A chemical closure study on the hygroscopicity of particles is demonstrated, and the perturbation of liquid water content by water-soluble organic matter is compared with that by inorganics.

■ 6926

#### **A 700 Year Sediment Record of Black Carbon and Polycyclic Aromatic Hydrocarbons near the EMEP Air-Monitoring Station in Aspöreten, Sweden**

Marie Elmquist, Zdenek Zencak, and Örjan Gustafsson

Millennial scale BC and PAH fluxes, sometimes decoupled, are related to patterns in energy consumption and emission control.

■ 6933

#### **Comparison of Fate and Transport of Isoxaflutole to Atrazine and Metolachlor in 10 Iowa Rivers**

Michael T. Meyer, Elisabeth A. Scribner, and Stephen J. Kalkhoff

The low-application-rate herbicide isoxaflutole is detected infrequently, but its herbicidally active degradate diketonitrile is detected frequently in Iowa stream water throughout the spring and summer.

■ 6940

#### **Origin, Occurrence, and Source Emission Rate of Acrolein in Residential Indoor Air**

Vincent Y. Seaman, Deborah H. Bennett, and Thomas M. Cahill

Acrolein concentrations in residential indoor air that result from stationary sources and human activities show diurnal patterns and are 3–40× higher than outdoor levels.

6947

#### **Arsenic Speciation Analysis of Cultivated White Button Mushrooms (*Agaricus bisporus*) Using High-Performance Liquid Chromatography–Inductively Coupled Plasma Mass Spectrometry and X-ray Absorption Spectroscopy**

Paula G. Smith, Iris Koch, and Kenneth J. Reimer

Novel information about arsenic uptake, transformation, and distribution by cultivated *A. bisporus* fungus is presented, particularly the presence of arsenobetaine in fruiting bodies.

6955

#### **▶ Tracing Increasing Tropical Andean Glacier Melt with Stable Isotopes in Water**

Bryan G. Mark and Jeffrey M. McKenzie

Stable isotopes in water are used to evaluate changes in the input of tropical glacier meltwater to stream flow as a function of satellite-observed glacier coverage and historic discharge records.

■ 6961

#### **▶ Distribution of Polybrominated Diphenyl Ethers in Human Umbilical Cord Serum, Paternal Serum, Maternal Serum, Placentas, and Breast Milk from Madrid Population, Spain**

generates substantially more secondary organic aerosol than can be explained by existing atmospheric models.

■ 6976

#### **Kinetics of Coupled Primary- and Secondary-Minimum Deposition of Colloids under Unfavorable Chemical Conditions**

Chongyang Shen, Baoguo Li, Yuanfang Huang, and Yan Jin

The important role that the secondary energy minimum plays in colloid deposition and the deposition's reversibility are demonstrated through theoretical analysis and experimentation.

■ 6983

#### ***In Situ* Experimental Assessment of Lake Whitefish Development following a Freshwater Oil Spill**

Adrian M. H. deBruyn, Barbara G. Wernick, Corey Stefura, Blair G. McDonald, Barri-Lynn Rudolph, Luanne Patterson, and Peter M. Chapman

Exposure to an oil spill in freshwater increases the incidence and severity of some teratogenic deformities in larval lake whitefish.

■ 6990

#### **Impact of Propene on Secondary Organic Aerosol Formation from *m*-Xylene**

Chen Song, Kwangsam Na, Bethany Warren, Quentin Malloy, and David R. Cocker, III

Propene and CO reduce aerosol formation from the *m*-xylene photooxidation system by directly influencing gas-phase chemistry and radical oxidant concentrations.

■ 6996

#### **Strong Colloidal and Dissolved Organic Ligands Binding Copper and Zinc in Rivers**

Stephen R. Hoffmann, Martin M. Shafer, and David E. Armstrong

Strong organic ligands for copper and zinc binding in freshwater show important differences in binding parameters between the colloidal and dissolved size fractions.

■ 7003

#### **Influence of Sorption to Dissolved Humic Substances on Transformation Reactions of Hydrophobic Organic Compounds in Water. I. Chlorination of PAHs**

Anett Georgi, Annett Reichl, Ulf Trommler, and Frank-Dieter Kopinke

The sorption of PAHs to dissolved humic acid accelerates the formation of chlorinated PAHs in the presence of hypochlorite.

■ 7010

#### **Redox and Complexation Interactions of Neptunium(V) with Quinonoid-Enriched Humic Derivatives**

Natalia S. Shcherbina, Irina V. Perminova, Stepan N. Kalmykov, Anton



7022

### **Geochemical and Geophysical Examination of Submarine Groundwater Discharge and Associated Nutrient Loading Estimates into Lynch Cove, Hood Canal, Wash.**

Peter W. Swarzenski, F. William Simonds, Anthony J. Paulson, Sarah Kruse, and Chris Reich

Geochemical tracers, multielectrode electrical resistivity images, and electromagnetic seepage meters are used to examine the bidirectional (i.e., submarine groundwater discharge and recharge) exchange of a coastal aquifer with seawater.

## **ENVIRONMENTAL MODELING**

■ 7030

### **Harmonic Analysis of Environmental Time Series with Missing Data or Irregular Sample Spacing**

Shabnam Dilmaghani, Isaac C. Henry, Puripus Soonthornnonda, Erik R. Christensen, and Ronald C. Henry

A tutorial on practical Fourier methods with application to storm water composition time series from Milwaukee, Wis., and 13 years of airborne particulate elemental carbon from Washington, D.C., is presented.

■ 7039

### **Enhanced Nitrogenous Disinfection Byproduct Formation near the Breakpoint: Implications for Nitrification Control**

I. Marie Schreiber and William A. Mitch

Nitrification control strategies that involve increased chlorine:nitrogen molar ratios or breakpoint chlorination may enhance nitrosamine and nitrile formation.

■ 7047

### **Bromide Oxidation and Formation of Dihaloacetic Acids in Chloraminated Water**

Stephen E. Duirk and Richard L. Valentine

A comprehensive reaction model is presented that describes monochloramine loss and the formation of dihaloacetic acids in the presence of natural organic matter and bromide.

## **ENVIRONMENTAL MEASUREMENTS METHODS**

7054

### **Automatic Baseline Correction by Wavelet Transform for Quantitative Open-Path Fourier Transform Infrared Spectroscopy**

Limin Shao and Peter R. Griffiths

A technique is described for automatic baseline correction of OP/FT-IR spectra that concomitantly reduces the number of factors for partial least-squares analysis.

7060

### **Measurements of OVOCs and NMHCs in a Swiss Highway**

Impact of the Formation of Short-Chain Nitrogen Compounds

## **REMEDIATION AND CONTROL TECHNOLOGIES**

■ 7073

### **Optimization of Peroxidase-Catalyzed Oxidative Coupling Process for Phenol Removal from Wastewater Using Response Surface Methodology**

Salehe Ghasempur, Seyed-Fakhreddin Torabi, Seyed-Omid Ranaei-Siadat, Mehdi Jalali-Heravi, Nasser Ghaemi, and Khosro Khajeh

Optimization of a peroxidase-catalyzed oxidative process for phenol removal from wastewater is carried out with response surface methodology.

■ 7080

### **Quantification of the Filterability of Freshwater Bacteria through 0.45, 0.22, and 0.1 $\mu\text{m}$ Pore Size Filters and Shape-Dependent Enrichment of Filterable Bacterial Communities**

Yingying Wang, Frederik Hammes, Nico Boon, and Thomas Egli

The passage of freshwater bacteria through 0.45, 0.22, and 0.1  $\mu\text{m}$  pore size sterilization membrane filters is quantified, and the regrowth of passing bacteria is demonstrated.

7087

### **Radiation-Induced Spent Nuclear Fuel Dissolution under Deep Repository Conditions**

Mats Jonsson, Fredrik Nielsen, Olivia Roth, Ella Ekeröth, Sara Nilsson, and Mohammad Mohsin Hossain

A new approach for simulation of radiation-induced spent nuclear fuel dissolution under deep repository conditions is presented that incorporates the most important elementary processes.

■ 7094

### **Distinguishing Abiotic and Biotic Transformation of Tetrachloroethylene and Trichloroethylene by Stable Carbon Isotope Fractionation**

Xiaoming Liang, Yiran Dong, Tomasz Kuder, Lee R. Krumholz, R. Paul Philp, and Elizabeth C. Butler

Bulk enrichment factors and apparent kinetic isotope effects for carbon are reported for reductive dechlorination of tetrachloroethylene and trichloroethylene by FeS and three microbial cultures.

7101

### **Artificial UV-B and Solar Radiation Reduce *In Vitro* Infectivity of the Human Pathogen *Cryptosporidium parvum***

Sandra J. Connelly, Elizabeth A. Wolyniak, Craig E. Williamson, and Kristen L. Jellison

The potential for the abiotic reduction of *C. parvum* infectivity is investigated by using both artificial and solar UV-B radiation under otherwise controlled environmental conditions.

■ 7107

### **Influence of Nonionic Surfactant on Attached Biofilm Formation and Phenanthrene Bioavailability during**



7120

### Photo-Assisted Electrochemical Oxidation of Atrazine on a Commercial Ti/Ru<sub>0.3</sub>Ti<sub>0.7</sub>O<sub>2</sub> DSA Electrode

G. R. P. Malpass, D. W. Miwa, A. C. P. Miwa, S. A. S. Machado, and A. J. Motheo

The degradation of the pesticide atrazine is studied using photo-assisted electrochemical methods at a dimensionally stable anode (DSA) of nominal composition Ti/Ru<sub>0.3</sub>Ti<sub>0.7</sub>O<sub>2</sub>.

7126

### Enhanced Biological Phosphorus Removal Driven by Short-Chain Fatty Acids Produced from Waste-Activated Sludge Alkaline Fermentation

Juan Tong and Yinguang Chen

Biological phosphorus removal with alkaline fermentative short-chain fatty acids of waste-activated sludge is studied.

■ 7131

### Effects of Increasing Acidity on Metal (loid) Bioprecipitation in Groundwater: Column Studies

Alexander C. Davis, Bradley M. Patterson, Michelle E. Grassi, Blair S. Robertson, Henning Prommer, and Allan J. McKinley

The effects of a step increase in acidity on bacterial denitrification, sulfate reduction, and metal (loid) bioprecipitation are investigated in large-scale column experiments.

## SUSTAINABILITY ENGINEERING AND GREEN CHEMISTRY

7138

### ► Evaluation of Life-Cycle Air Emission Factors of Freight Transportation

Cristiano Facanha and Arpad Horvath

Total life-cycle air emissions from road, rail, and air transportation of freight are underestimated if only tailpipe emissions are included.

7145

### Studying the Effect on System Preference by Varying Coproduct Allocation in Creating Life-Cycle Inventory

Mary Ann Curran

Comparison of conventional and ethanol-containing gasoline by variation of the allocation basis (weight, volume, market value, energy, and demand) shows no effect on which fuel has lower environmental impacts.

## ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH

■ 7152

Estrogenic Activity of Volatile Organic Compounds and

Michelle M. (MacDonald) Phillips, Mary Joyce A. Dinglasan-Panlilio, Scott A. Mabury, Keith R. Solomon, and Paul K. Sibley

Results are reported from the first study to show that fluorotelomer acids exhibit toxicity at much smaller concentrations than their perfluorinated acid counterparts to aquatic plant and invertebrate species.

■ 7164

### Evolution of Ecotoxicity upon Fenton's Oxidation of Phenol in Water

J. A. Zazo, J. A. Casas, C. B. Molina, A. Quintanilla, and J. J. Rodriguez

The neutralization step represents an advantage of the Fenton process with respect to other oxidation treatments because it leads to a significant reduction in ecotoxicity.

7171

### Cadmium Ecophysiology in Seven Stonefly (*Plecoptera*) Species: Delineating Sources and Estimating Susceptibility

Caitrin A. Martin, Samuel N. Luoma, Daniel J. Cain, and David B. Buchwalter

Biodynamic modeling and subcellular compartmentalization of cadmium from aqueous and dietary sources are used to predict susceptibility differences among closely related stonefly species.

7178

### Chronic Disease and Early Exposure to Air-Borne Mixtures. I. The Environmental Quality Database

James Argo

A description is provided of the Environmental Quality Database, which examines early residential exposure to ~50 U.S. Standard Industrial Classification (SIC) codes as a factor in 1 of 18 rare cancers; all instances of an SIC are included.

■ 7185

### Chronic Disease and Early Exposure to Air-Borne Mixtures. II. Exposure Assessment

James Argo

A retrospective exposure assessment with the RASH relative potency strategy is described to compare industrial air-borne mixtures to a reference compound, benzo[*a*]pyrene, for exposure up to 35 years before 1993.

## ADDITIONS AND CORRECTIONS

■ 7192

### Analysis of Lagoon Samples from Different Concentrated Animal Feeding Operations (CAFOs) for Estrogens and Estrogen Conjugates

Stephen R. Hutchins, Mark V. White, Felisa M. Hudson, and Dennis D. Rice