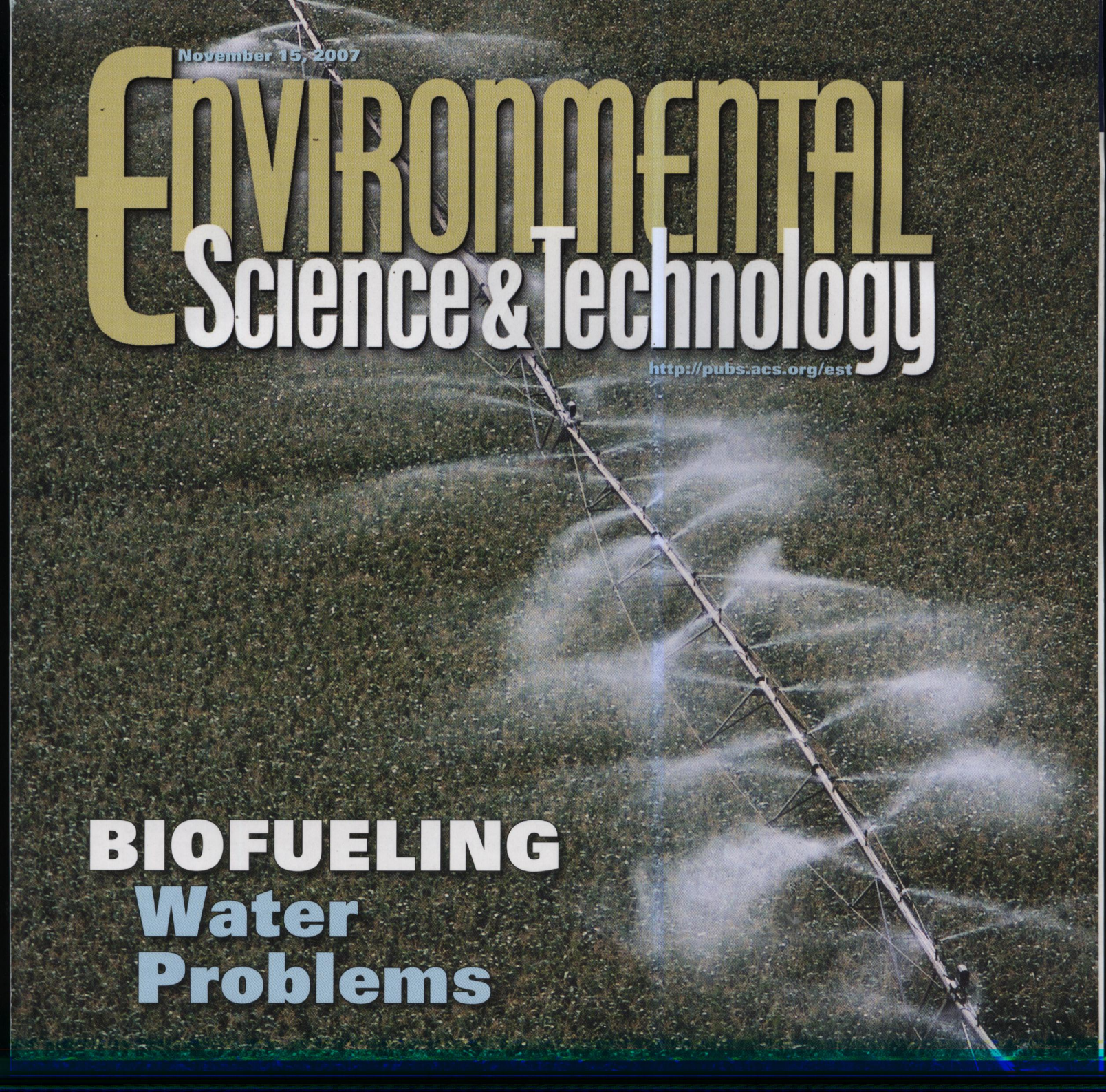


November 15, 2007

ENVIRONMENTAL Science & Technology

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BIOFUELING
Water
Problems



News and Features

NEWS

7588 Identifying mercury's fingerprint

Scientists have a new way to track mercury in the environment.

7589 A new flame retardant in household dust

Researchers in Canada have found that Dechlorane Plus accumulates indoors.

7589-7591 News Briefs

Climate change will sink agriculture • U.S. agencies neglect climate change • "Striking" climate effects • Worldwide water online

7590 Have public-health research funds been diverted in the U.S.?

Scientists charge that the National Institute of Environmental Health Sciences has cut traditional environmental and public-health programs in favor of research on treating disease.

7591 Tamiflu survives sewage treatment

Continued use of the world's most effective drug against a potential bird flu pandemic could be in jeopardy.

7592 Climate Watch

Are polar bears too polarizing?

Editors' note: This is the first article in a new *ES&T* series called Climate Watch, an ongoing analysis of the latest news about the science, politics, and policy of global climate change.

PERSPECTIVE

7593 Biofueling Water Problems

Erika Engelhaupt

A new report from the U.S. National Research Council raises questions about the effects that homegrown fuels could have on water quality.

FEATURE

7597 Environmental Problems and Challenges in China

Bo-jie Fu, Xu-liang Zhuang, Gui-bin Jiang, Jian-bo Shi, and Yi-he Lü

As China's gross domestic product continues to rise

Research

7603

Instructions to Authors for *Environmental Science & Technology*

CRITICAL REVIEWS

■ 7609

Metal Flux and Dynamic Speciation at (Bio)interfaces. Part I: Critical Evaluation and Compilation of Physicochemical Parameters for Complexes with Simple Ligands and Fulvic/Humic Substances

Jacques Buffle, Zeshi Zhang, and Konstantin Startchev

Parameter values and corresponding theoretical concepts required to perform metal flux computation at consuming interfaces in aquatic systems containing simple ligands, fulvics/humics, and particulate complexants are described.

■ 7621

Metal Flux and Dynamic Speciation at (Bio)interfaces. Part II: Evaluation and Compilation of Physicochemical Parameters for Complexes with Particles and Aggregates

Zeshi Zhang, Jacques Buffle, and Davide Alemani

Information is provided on parameter values and corresponding theoretical concepts required to perform metal flux computation at consuming interfaces.

CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

■ 7632

Atmospheric Transport of Mercury to the Tibetan Plateau

Mark Loewen, Shichang Kang, Debbie Armstrong, Qiangong Zhang, Gregg Tomy, and Feiyue Wang

Atmospheric mercury deposited on the Tibetan Plateau is associated primarily with particulate matter.

■ 7639

Atmospheric Atrazine at Canadian IADN Sites

Yuan Yao, Elisabeth Galarneau, Pierrette Blanchard, Nick Alexandrou, Kenneth A. Brice, and Yi-Fan Li

A multiyear investigation of atmospheric atrazine concentrations at three Canadian IADN sites reveals seasonality, source

■ 7653

Uranium Deposition in a Weathered Fractured Saprolite/Shale

Debra H. Phillips, David B. Watson, and Yul Roh

The relationship between U, total P and S, and Al, Fe, and Mn oxides is examined in fractured shale under field conditions.

■ 7661

Nitrogen Isotopes as Indicators of NO_x Source Contributions to Atmospheric Nitrate Deposition Across the Mid-western and Northeastern United States

E. M. Elliott, C. Kendall, S. D. Wankel, D. A. Burns, E. W. Boyer, K. Harlin, D. J. Bain, and T. J. Butler

In a large-scale survey, stable isotopes of nitrogen in rainwater are used to elucidate source contributions to atmospherically deposited nutrients in the northeastern U.S.

■ 7668

Body Loadings and Health Risk Assessment of Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans at an Intensive Electronic Waste Recycling Site in China

Janet K. Y. Chan, Guan Hua Xing, Ying Xu, Ying Liang, Ling Xuan Chen, Sheng Chun Wu, Chris K. C. Wong, Clement K. M. Leung, and Ming H. Wong

Evidence is provided that primitive electronic waste recycling in China leads to high levels of dioxins in local residents and in the environment.

■ 7675

Factors Influencing Mobile Source Particulate Matter Emissions-to-Exposure Relationships in the Boston Urban Area

Susan L. Greco, Andrew M. Wilson, Steven R. Hanna, and Jonathan I. Levy

The CAL3QHCR line-source model is used to determine which meteorological and population parameters influence intake fractions; findings indicate the likelihood of substantial intraurban variability.

■ 7683

Speciation of Selenium in Stream Insects Using X-ray Absorption Spectroscopy

Ruwandi Andrahennadi, Mark Wayland, and Ingrid J. Pickering

Selenium speciation among stream biota is studied with synchrotron X-ray absorption spectroscopy.

7688

Anthropogenically Driven Changes in Chloride Complicate Interpretation of Base Cation Trends in Lakes Recovering from Acidic Deposition

Catherine H. Rosfjord, Katherine E. Webster, Jeffrey S. Kahl, Stephen A. Norton, Ivan J. Fernandez, and Alan T. Herlihy

The chemical signals of recovery from acidic deposition in the northeastern lakes are being confounded by altered base cation biogeochemistry related to increased anthropogenic salt loading.

7694

Detection of Dechlorane Plus in Residential Indoor Dust

7706

Long-Term Increase in Dissolved Organic Carbon in Streamwaters in Norway Is Response to Reduced Acid Deposition

Heleen A. de Wit, Jan Mulder, Atle Hindar, and Lars Hole

Analysis of stream water DOC in Norway suggests increased solubility of organic matter because of reduced acid deposition as the mechanism behind the long-term rise in DOC.

■ 7714

Attenuation of Fluorocarbons Released from Foam Insulation in Landfills

Charlotte Scheutz, Yutaka Dote, Anders M. Fredenslund, Hans Mosbjk, and Peter Kjeldsen

Fluorocarbons released from foam insulation disposed of in landfills may be attenuated strongly by microbial degradation reactions.

■ 7723

Persistent Chlordane Concentrations in Long Island Sound Sediment: Implications from Chlordane, ²¹⁰Pb, and ¹³⁷Cs Profiles

Lijia Yang, Xiqing Li, John Crusius, Urs Jans, Michael E. Melcer, and Pengfei Zhang

Continued input and significant sediment mixing lead to persistent chlordane concentrations in surficial sediment in Long Island Sound.

■ 7730

Kinetics of Reductive Dissolution of Hematite by Bioreduced Anthraquinone-2,6-disulfonate

Chongxuan Liu, John M. Zachara, Nancy S. Foster, and Janae Strickland

Reduction of hematite by anthraquinone-2,6-disulfonate is studied under conditions of variable but controlled pH, flow rate, and Fe(II) and phosphate concentrations in a flow-through system.

■ 7736

Reductive Dechlorination Pathways of Tetrachloroethylene and Trichloroethylene and Subsequent Transformation of Their Dechlorination Products by Mackinawite (FeS) in the Presence of Metals

Hoon Y. Jeong, Haekyung Kim, and Kim F. Hayes

Fe(II), Co(II), Ni(II), and Hg(II) significantly impact reductive dechlorination pathways of PCE and TCE and subsequent transformation of their initial dechlorination products by FeS.

■ 7744

Microbial Dehalogenation of Trichlorinated Dibenzo-*p*-dioxins by a *Dehalococcoides*-Containing Mixed Culture Is Coupled to Carbon Isotope Fractionation

Eva-Maria Ewald, Anke Wagner, Ivonne Nijenhuis, Hans-Hermann Richnow, and Ute Lechner

Reductive dehalogenation of trichlorodibenzo-*p*-dioxins is associated with carbon isotope fractionation, which leads to characteristic isotope compositions of metabolites potentially useful to trace *in situ* dehalogenation.

Equilibrium partitioning modeling shows that plastics have the potential to sorb contaminants in the sea-surface microlayer and transport them to benthic organisms.

■ 7765

Iron-Mediated Microbial Oxidation and Abiotic Reduction of Organic Contaminants under Anoxic Conditions

Nicole B. Tobler, Thomas B. Hofstetter, Kristina L. Straub, Daniela Fontana, and René P. Schwarzenbach

Toluene oxidation by a dissimilatory Fe(III)-reducing microorganism generates reactive Fe(II) species for the reduction of nitroaromatic contaminants.

■ 7773

Assessing Iron-Mediated Oxidation of Toluene and Reduction of Nitroaromatic Contaminants in Anoxic Environments Using Compound-Specific Isotope Analysis

Nicole B. Tobler, Thomas B. Hofstetter, and René P. Schwarzenbach
Carbon and nitrogen isotope signatures of organic contaminants can provide evidence for the coupling of microbial toluene oxidation to abiotic reduction of nitroaromatic compounds under iron-reducing conditions.

■ 7781

Spectroscopic Investigation of the Uptake of Arsenite from Solution by Synthetic Mackinawite

Tanya J. Gallegos, Sung Pil Hyun, and Kim F. Hayes

Solid products formed during arsenite reaction with mackinawite are characterized with X-ray absorption spectroscopy and X-ray diffraction as a function of pH and As(III) concentration.

■ 7787

Significance of *Chloroflexi* in Performance of Submerged Membrane Bioreactors (MBR) Treating Municipal Wastewater

Yuki Miura, Yoshimasa Watanabe, and Satoshi Okabe

The potential function of uncultured *Chloroflexi* to prevent membrane fouling in the MBR treating municipal wastewater is investigated.

7795

Chemical Kinetic and Molecular Genetic Study of Selenium Oxyanion Reduction by *Enterobacter cloacae* SLD1a-1

Jincai Ma, Donald Y. Kobayashi, and Nathan Yee

The bacterium *E. cloacae* reduces Se(IV) at faster rates than it reduces Se(VI) and uses different enzymatic systems to catalyze the reduction reactions.

7802

Carbon Suboxide, a Highly Reactive Intermediate from the Abiotic Degradation of Aromatic Compounds in Soil

Stefan G. Huber, Gerhard Kilian, and Heinz F. Schöler

The abiotic degradation of polyhydroxylated aromatic substances by Fe³⁺, H₂O₂, and chloride leads to the highly reactive compound carbon suboxide in soil.

vide significant improvements in the estimation of plant phenanthrene uptake.

7824

Methoxyphenols and Levoglucosan Ratios in PM_{2.5} from Wheat and Kentucky Bluegrass Stubble Burning in Eastern Washington and Northern Idaho

Jorge R. Jimenez, Candis S. Claiborn, Ranil S. Dhammapala, and Christopher D. Simpson

Levoglucosan and methoxyphenols are evaluated as tracers for apportioning particulate matter pollution from wheat and Kentucky bluegrass stubble burning in urban areas.

ENVIRONMENTAL MEASUREMENTS METHODS

■ 7830

Characterization of Toxic Effects of Sediment-Associated Organic Pollutants Using the λ Transgenic Medaka

Jérôme Cachot, Mac Law, Didier Pottier, Laurent Peluhet, Michelle Norris, Hélène Budzinski, and Richard Winn

A novel bioassay that uses λ transgenic medaka embryos to characterize genotoxic and nongenotoxic effects of sediment-associated organic pollutants is described.

■ 7837

Measuring Simultaneous Production and Consumption Fluxes of Methyl Chloride and Methyl Bromide in Annual Temperate Grasslands

Robert C. Rhew and Triffid Abel

Gross production and consumption fluxes of methyl halides in California grasslands are quantified with a novel field-based stable isotope tracer technique.

■ 7844

Characterization and Quantification of Reversible Redox Sites in Humic Substances

Nopawan Ratasuk and Mark A. Nanny

A Pd/H₂ catalytic method is used to characterize redox functional groups in several humic substances and quantify their reversible electron-carrying capacity.

7851

Bioaccessibility of Metals in Dust from the Indoor Environment: Application of a Physiologically Based Extraction Test

Andrew Turner and Ka-Hei Ip

Bioaccessible concentrations of metals in indoor dust are variable but, in many cases, display an inverse dependence on total metal concentration.

7857

MEMS Needle-type Sensor Array for in Situ Measurements of Dissolved Oxygen and Redox Potential

Jin-Hwan Lee, Youngwoo Seo, Tae-Sun Lim, Paul L. Bishop, and Ian Papautsky

REMEDATION AND CONTROL TECHNOLOGIES

7870

Understanding Mercury Transformations in Coal-Fired Power Plants: Evaluation of Homogeneous Hg Oxidation Mechanisms

Balaji Krishnakumar and Joseph J. Helble

A detailed chemical kinetic analysis is given of the fundamental gas-phase mercury transformation mechanisms under conditions representative of utility boilers.

7876

Solid-State, Planar Photoelectrocatalytic Devices Using a Nanosized TiO₂ Layer

Jing Shang, Shaodong Xie, Tong Zhu, and Jia Li

A new type of solid-state device is presented for electrically assisted photocatalytic degradation of organic gaseous pollutants; although this technique has been widely used in the solid-liquid phase, here it is studied in the solid-gas phase.

■ 7881

Effect of TCE Concentration and Dissolved Groundwater Solutes on NZVI-Promoted TCE Dechlorination and H₂ Evolution

Yueqiang Liu, Tanapon Phenrat, and Gregory V. Lowry

Trichloroethylene concentration and common inorganic groundwater solutes affect the rate and extent of TCE dechlorination and H₂ evolution from nanoscale zero valent iron (NZVI).

■ 7888

Approaches To Mitigate the Impact of Dissolved Organic Matter on the Adsorption of Synthetic Organic Contaminants by Porous Carbonaceous Sorbents

Yanping Guo, Abhishek Yadav, and Tanju Karanfil

Understanding optimum pore region(s) for adsorption of target synthetic organic contaminants and dissolved organic matter components is important in the selection of porous carbonaceous adsorbents for treatment operations.

■ 7895

Enhanced Power from Chambered Benthic Microbial Fuel Cells

Mark E. Nielsen, Clare E. Reimers, and Hilmar A. Stecher, III

A novel benthic microbial fuel cell improves power output by enclosing high-surface-area anodes in a benthic chamber and forcing pore-water advection.

■ 7901

Fe-USY Zeolite Catalyst for Effective Decomposition of Nitrous Oxide

Lan Dong Li, Qun Shen, Jun Jie Yu, Zheng Ping Hao, Zhi Ping Xu, and G. Q. Max Lu

SUSTAINABILITY ENGINEERING AND GREEN CHEMISTRY

■ 7915

Producing Bio-Based Bulk Chemicals Using Industrial Biotechnology Saves Energy and Combats Climate Change

B. G. Hermann, K. Blok, and M. K. Patel

Production of bio-based bulk chemicals by biotechnology allows drastic savings of nonrenewable energy use and greenhouse gas emissions.

■ 7922

Characterization of Hydrocarbon Emissions from Green Sand Foundry Core Binders by Analytical Pyrolysis

Yujue Wang, Fred S. Cannon, Magda Salama, Jeff Goudzwaard, and James C. Furness

Volatile hydrocarbon and HAP emissions of three core binder systems used in green sand foundries are evaluated to minimize HAP emissions and to facilitate compliance with air-emission regulations.

ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH

■ 7928

Exposure of an Adult Population to Perfluorinated Substances Using Duplicate Diet Portions and Biomonitoring Data

Hermann Fromme, Martin Schlummer, Angela Möller, Ludwig Gruber, Gerd Wolz, Jan Ungewiss, Sigrun Böhmer, Wolfgang Dekant, Richard Mayer, Bernhard Liebl, and Dorothee Twardella

Food intake is a main PFC source in the general population, and this intake is below tolerable daily intake values.

■ 7934

Controlled Exposure Chamber Study of Uptake and Clearance of Airborne Polycyclic Aromatic Hydrocarbons by Wheat Grain

Reiko Kobayashi, Thomas M. Cahill, Robert A. Okamoto, Randy L. Maddalena, and Norman Y. Kado

Concentrations in the gas phase and in grain are monitored, model work is conducted, and the implications for human exposure are discussed.

7941

Combined Cadmium and Thiuram Show Synergistic Toxicity and Induce Mitochondrial Petite Mutants

Hitoshi Iwahashi, Emi Ishidou, Emiko Kitagawa, and Yuko Momose
DNA microarray analysis reveals that the combination of cadmium and thiuram causes mitochondrial damage to yeast cells.

CORRESPONDENCE AND REBUTTAL

7947

Comment on "1,1,2,2-Tetrachloroethane Reactions with