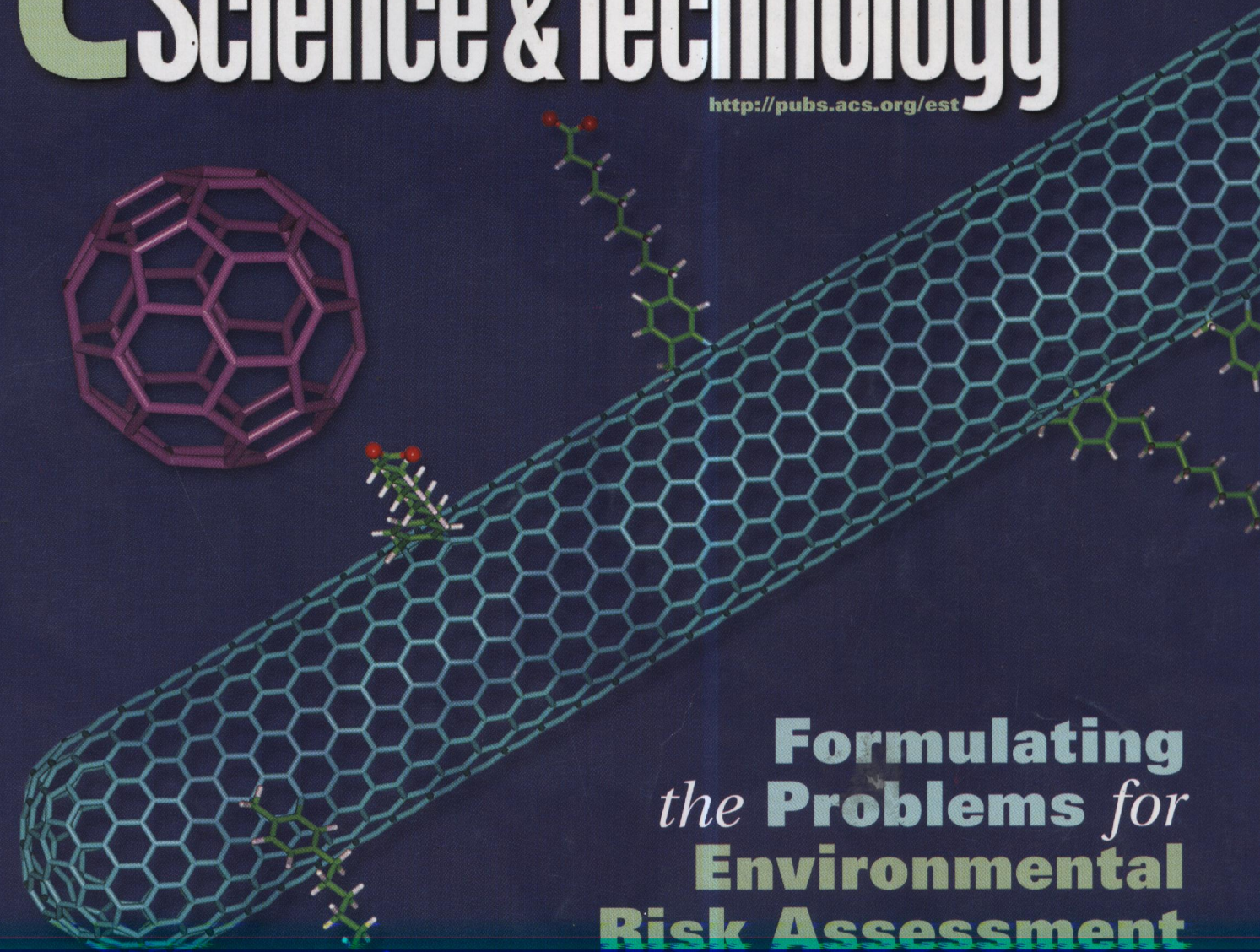


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ENVIRONMENTAL Science & Technology

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**Formulating
the Problems for
Environmental
Risk Assessment**

News and features

NEWS

5576 PBDEs in electronics-recycling workers in China

Record high levels of the Deca PBDE flame retardant point to a need for more research into how the human body metabolizes the compound.

5577 E-waste recycling spews dioxins into the air

Air around e-waste recycling areas in Guiyu, China, contains the highest levels of dioxins ever recorded.

5577-5580 News Briefs

Investing in renewable energy • Mixed reports on EU industrial pollutants • Battling climate change the American way • Nuclear energy: not a climate cure • Shift urged for chemical toxicity testing • Sustainable coal use

5578 The muddy waters of wetland protection

New U.S. EPA-Army Corps of Engineers guidance fails to clear up confusion about the protection of small streams and wetlands.

5579 Environmental costs of desalination

A growing trend toward desalination could aggravate climate change, an environmental group warns.

5580 Green chemistry gets the prize

This year's winners advance sustainability with efficient bio-based materials and processes.

VIEWPOINT

5582 Formulating the Problems for Environmental Risk Assessment of Nanomaterials

Richard Owen and Richard Handy

Several countries and international organizations are considering whether to commit large amounts of funding to examine the potential risks of nanomaterials to the environment. Owen and Handy suggest that problem formulation and prioritization need to be included in environmental risk assessments. These two critically important, often overlooked components can help define the actual problem in

Research

POLICY ANALYSIS

■ 5589

Intentions of UK Farmers toward Biofuel Crop Production: Implications for Policy Targets and Land Use Change

Elizabeth H. A. Mattison and Ken Norris

U.K. farmers are unlikely to produce sufficient biofuel crops to meet EU targets without significant policy changes and shifts in land use.

CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

5595

Time Trends of Polybrominated Diphenyl Ethers in Sediment Cores from the Pearl River Estuary, South China

She-Jun Chen, Xiao-Jun Luo, Zhen Lin, Yong Luo, Ke-Chang Li, Xian-Zhi Peng, Bi-Xian Mai, Yong Ran, and Eddy Y. Zeng

Historical records, inventories, and fluxes of PBDEs in the estuary sediments in a rapidly developing region of China are reconstructed and estimated.

■ 5601

Analysis of Trends in Episodic Acidification of Streams in Western Maryland

Kathleen M. Kline, Keith N. Eshleman, Raymond P. Morgan II, and Nancy M. Castro

The changes in the magnitude and mechanisms of episodic acidification of an acid-sensitive stream in western Maryland during the 1990s are documented.

■ 5608

Atmospheric Occurrence and Deposition of Polycyclic Aromatic Hydrocarbons in the Northeast Tropical and Subtropical Atlantic Ocean

Sabino Del Vento and Jordi Dachs

The atmospheric occurrence and deposition of PAHs measured in the northeastern tropical and subtropical Atlantic show the complex interplay of physical and geochemical processes driving their fate.

■ 5614

Bicarbonate is a proven competitor for As on goethite, but the natural As loading of sediments is 1–2 orders of magnitude lower than explained by HCO_3^- -As competition alone.

■ 5626

Sources of Speciated Atmospheric Mercury at a Residential Neighborhood Impacted by Industrial Sources

Helen Manolopoulos, David C. Snyder, James J. Schauer, Jason S. Hill, Jay R. Turner, Mark L. Olson, and David P. Krabbenhoft

Sources of primary emissions of gas- and particle-phase atmospheric reactive mercury in a residential area impacted by industrial sources are identified.

■ 5634

Spatial and Temporal Trends of Mercury Loadings to Michigan Inland Lakes

Matthew J. Parsons, David T. Long, Sharon S. Yohn, and John P. Giesy

Spatial and temporal patterns of mercury loading to inland lakes indicate that regional- and local-scale sources can be differentiated and that the impacts of local-scale sources are considerable.

■ 5641

Severe PCDD/F and PBDD/F Pollution in Air around an Electronic Waste Dismantling Area in China

Huiyu Li, Liping Yu, Guoying Sheng, Jiameo Fu, and Ping'an Peng

The PCDD/F and PBDD/F emissions from an e-waste dismantling area in China are described.

■ 5647

Exposure of Electronics Dismantling Workers to Polybrominated Diphenyl Ethers, Polychlorinated Biphenyls, and Organochlorine Pesticides in South China

Xinhui Bi, Gareth O. Thomas, Kevin C. Jones, Weiyue Qu, Guoying Sheng, Francis L. Martin, and Jiameo Fu

High concentrations of Deca BDE and other PBDEs are found in residents of a Chinese town dominated by the e-waste dismantling industry.

■ 5654

Air–Sea Exchange Fluxes of Synthetic Polycyclic Musks in the North Sea and the Arctic

Zhiyong Xie, Ralf Ebinghaus, Christian Temme, Olaf Heemken, and Wolfgang Ruck

An investigation during a polar expedition and coastal survey reveals distribution and atmospheric transport of synthetic musk fragrances from source regions to remote oceans.

5660

Photodegradation of Perfluorooctane Sulfonate by UV Irradiation in Water and Alkaline 2-Propanol

Takashi Yamamoto, Yukio Noma, Shin-ichi Sakai, and Yasuyuki Shibata

Photodegradation of PFOS in water and alkaline 2-propanol by internal irradiation at 254 nm is confirmed.

Tenax extraction and matrix-SPME are used to study desorption kinetics of five different classes of hydrophobic organic contaminants from sediments of differing characteristics.

5679

Humic Acids Increase Dissolved Lead Bioavailability for Marine Invertebrates

Paula Sánchez-Marín, J. Ignacio Lorenzo, Ronny Blust, and Ricardo Beiras

Both Pb toxicity for *Paracentrotus lividus* larvae and Pb uptake by excised *Mytilus edulis* gills are enhanced in the presence of HAs in seawater.

5685

Evaluation of Mercury Toxicity as a Predictor of Mercury Bioavailability

George R. Golding, Carol A. Kelly, Richard Sparling, Peter C. Loewen, and Tamar Barkay

Hg toxicity as an indicator of how different conditions will affect bioavailability for Hg(II) uptake into bacteria is sometimes, but not always, correct.

■ 5693

Insight into Methyl-*tert*-Butyl Ether (MTBE) Stable Isotope Fractionation from Abiotic Reference Experiments

Martin Elsner, Jennifer McKelvie, Georges Lacrampe Couloume, and Barbara Sherwood Lollar

MTBE stable isotope fractionation in acid hydrolysis and permanganate oxidation displays a reaction-specific pattern and aids in the interpretation of observable fractionation in the field.

■ 5701

Uranium Biomineralization as a Result of Bacterial Phosphatase Activity: Insights from Bacterial Isolates from a Contaminated Subsurface

Melanie J. Beazley, Robert J. Martinez, Patricia A. Sobecky, Samuel M. Webb, and Martial Taillefer

Aerobic biomineralization of U(VI)-phosphate facilitated by microbial phosphatase activity, especially in low pH conditions, may play an important role in the bioremediation of uranium.

■ 5708

Catalytic Effect of CuO and Other Transition Metal Oxides in Formation of Dioxins: Theoretical Investigation of Reaction Between 2,4,5-Trichlorophenol and CuO

Qiao Sun, Mohammednoor Altarawneh, Bogdan Z. Dlugogorski, Eric M. Kennedy, and John C. Mackie

The density functional theory has been applied to describe the energetics and reaction pathways for CuO catalyzing the formation of the chlorophenoxy radical.

■ 5716

In Situ Bioreduction of Uranium(VI) to Submicromolar Levels and Reoxidation by Dissolved Oxygen

Wei-Ming Wu, Jack Carley, Han-Lin Liu, Matthew A. Gardner, Vogel, Erick

Thomas Van Nooten, François Lieben, Jan Dries, Eric Pirard, Dirk Springael, and Leen Bastiaens

The activity of sulfate-reducing bacteria and the subsequent formation of iron sulfides enhanced Fe⁰ reactivity in columns operated under conditions promoting sulfate reduction.

■ 5731

Roles of Acetone Conditioning and Lipid in Sorption of Organic Contaminants

Xilong Wang and Baoshan Xing

Acetone conditioning and lipids affect sorption of organic contaminants by soil and its humic substances.

ENVIRONMENTAL MODELING

■ 5738

Disentangling Oil Weathering Using GC×GC. 1. Chromatogram Analysis

J. Samuel Arey, Robert K. Nelson, and Christopher M. Reddy

With GC×GC, thousands of hydrocarbon compounds can be separated and their partitioning properties estimated simultaneously, thus enabling the differentiation of evaporation and dissolution signatures in oils.

■ 5747

Disentangling Oil Weathering Using GC×GC. 2. Mass Transfer Calculations

J. Samuel Arey, Robert K. Nelson, Desiree L. Plata, and Christopher M. Reddy

GC×GC is used to successfully predict mass transfer rates and calculate mass apportionments to air and water for hundreds of hydrocarbon compounds in weathered oils.

■ 5756

High-Resolution Atmospheric Modeling of Fluorotelomer Alcohols and Perfluorocarboxylic Acids in the North American Troposphere

Greg Yarwood, Susan Kembell-Cook, Michael Keinath, Robert L. Waterland, Stephen H. Korzeniowski, Robert C. Buck, Mark H. Russell, and Stephen T. Washburn

An atmospheric model with high spatial and temporal resolution is used to evaluate the potential contribution of fluorotelomer alcohol and perfluorocarboxylate emissions to air concentrations of FTOH, perfluorooctanoic acid, and perfluorononanoic acid in North America and the Canadian Arctic.

■ 5763

Positive Matrix Factorization (PMF) Analysis of Molecular Marker Measurements to Quantify the Sources of Organic Aerosols

Jeffrey M. Jaekels, Min-Suk Bae, and James J. Schauer

A multivariant model and a chemical tracer model with a common data set of organic tracers for source apportionment of organic aerosols are compared.

■ 5778

Carbon Isotopes in Tree Rings of Norway Spruce Exposed to Atmospheric Pollution

Hana Šantrůčková, Jiří Šantrůček, Jiří Šetlík, Miroslav Svoboda, and Jiří Kopáček

An effect of atmospheric deposition and soil pollution on carbon isotopic composition in tree rings of Norway spruce is demonstrated.

5783

Real-Time Estimation of Elemental Carbon Emitted from a Diesel Engine

Arthur L. Miller, Matthew C. Habjan, and Kihong Park

This preliminary study shows that a photometer can estimate the mass concentration of elemental carbon exiting a diesel engine.

REMEDIATION AND CONTROL TECHNOLOGIES

■ 5789

Secondary Effects of Catalytic Diesel Particulate Filters: Copper-Induced Formation of PCDD/Fs

Norbert V. Heeb, Markus Zennegg, Erika Gujer, Peter Honegger, Kerstin Zeyer, Urs Gfeller, Adrian Wichser, Martin Kohler, Peter Schmid, Lukas Emmenegger, Andrea Ulrich, Daniela Wenger, Jean-Luc Petermann, Jan Czerwinski, Thomas Mosimann, Markus Kasper, and Andreas Mayer

Although iron-catalyzed diesel particulate filters do not increase PCDD/Fs emissions, in the case of copper-catalyzed filters, emissions increase by up to 3 orders of magnitude.

■ 5795

Distributions of Pharmaceuticals in an Urban Estuary during both Dry- and Wet-Weather Conditions

Mark J. Benotti and Bruce J. Brownawell

Pharmaceutical distributions in surface waters of a wastewater-impacted urbanized estuary are generally consistent with conservative behavior and minor removal attributed to microbial degradation, but these distributions can drastically change after a combined sewer overflow event.

■ 5803

An Evaluation of the OECD 308 Water/Sediment Systems for Investigating the Biodegradation of Pharmaceuticals

Jon F. Ericson

The OECD 308 method for characterizing biodegradation of pharmaceuticals is evaluated and its suitability for use in EMEA Phase II A Tier testing is assessed.

■ 5812

DRIFT Study of Manganese/Titania-Based Catalysts for Low-Temperature Selective Catalytic Reduction of NO with NH₃

Zhongbiao Wu, Boqiong Jiang, Yue Liu, Haiqiang Wang, and Ruiben Jin

A DRIFT study of Mn/TiO₂ and Fe-Mn/TiO₂ for the reduction

■ 5824**Identification of Active Agents for Tetrachloroethylene Degradation in Portland Cement Slurry Containing Ferrous Iron**

Saebom Ko and Bill Batchelor

This research identifies the potential active agents for reductive dechlorination in Fe(II)-DS/S and their formation conditions.

■ 5833**Suppression of Dioxin Emission in Co-Incineration of Poly(vinyl Chloride) with TiO₂-Encapsulating Polystyrene**

Jeongsoo Choi, Oksun Kim, and Seung-Yeop Kwak

Addition of TiO₂ nanoparticles into a co-incineration system reduces the concentration of dioxin and its precursors in exhaust gases; suppression is successfully enhanced by the TiO₂ encapsulation.

■ 5839**A Stable Isotope Approach for the Quantification of Sewer Infiltration**

Oliver Kracht, Markus Gresch, and Willi Gujer

Natural isotopic signatures of different waters are successful at accurately quantifying the extraneous discharge of groundwater in a combined sewer network.

5846**Mechanism of the Photocatalytic Degradation of C.I. Reactive Black 5 at pH 12.0 Using SrTiO₃/CeO₂ as the Catalyst**

Shuang Song, Lejin Xu, Zhiqiao He, Jianmeng Chen, Xiuzhen Xiao, and Bing Yan

The detailed mechanism of photocatalytic oxidation of RB5 is elucidated through the use of different $h\nu_{vb}^+$, $\cdot OH$, and e_{cb}^- scavengers and is verified by TOC analysis and spectroscopic and chromatographic techniques.

5854**Impact of Transgenic Tobacco on Trinitrotoluene (TNT) Contaminated Soil Community**

Emma R. Travis, Nerissa K. Hannink, Christopher J. van der Gast, Ian P. Thompson, Susan J. Rosser, and Neil C. Bruce

Transgenic tobacco plants expressing a bacterial nitroreductase gene can increase the functional and genetic diversity of the rhizosphere community structure in soil polluted with 2,4,6-TNT.

■ 5862**DC Corona Electric Discharges for Air Pollution Control. Part 1. Efficiency and Products of Hydrocarbon Processing**

Ester Marotta, Alessandro Callea, Massimo Rea, and Cristina Paradisi

A large (~0.7 L) wire cylinder benchtop reactor is developed and tested for DC corona processing of VOC-contaminated air at room temperature and pressure.

nistic model describing bioreactor operation for predicting benzyl alcohol accumulation in a chemostat reactor treating toluene.

SUSTAINABILITY ENGINEERING AND GREEN CHEMISTRY**5882****Solid Waste Management of a Chemical-Looping Combustion Plant using Cu-Based Oxygen Carriers**

Francisco García-Labiano, Pilar Gayán, Juan Adánez, Luis F. De Diego, and Carmen R. Forero

The proposed recovery process decreases greatly the amount of natural resources (Cu and Al₂O₃) used in a CLC power plant as well as the waste generated in the process.

ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH**■ 5888****Estimation of Chemical Toxicity to Wildlife Species Using Interspecies Correlation Models**

S. Raimondo, P. Mineau, and M. G. Barron

Interspecies correlation estimation models are derived for wildlife species for acute toxicity estimation in ecological risk assessment.

5895**Elimination of Mercury by Yellow Perch in the Wild**

Jillian L. A. Van Wallegghem, Paul J. Blanchfield, and Holger Hintelmann

Elimination rates of isotopically enriched methylmercury by yellow perch in the wild are >5× slower than those in past laboratory studies and current MeHg bioaccumulation models.

■ 5902**Lead Bioaccessibility in Food Web Intermediates and the Influence on Ecological Risk Characterization**

Claire A. Kaufman, Joseph R. Bennett, Iris Koch, and Kenneth J. Reimer

With novel methods, the bioaccessible fraction of Pb in soil and food is determined, providing a more realistic estimate of contaminant exposure for ecological receptors.

■ 5908**An In Vivo Multiwell-Based Fluorescent Screen for Monitoring Vertebrate Thyroid Hormone Disruption**

Jean-Baptiste Fini, Sébastien Le Mével, Nathalie Turque, Karima Palmier, Daniel Zalko, Jean-Pierre Cravedi, and Barbara A. Demeneix

A semihigh-throughput screening in vivo assay with transgenic tadpoles to assess disruption of thyroid signaling is described.

5915**Infrared Spectral Analysis of MCF-7 Cells Treated**