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Life-Cycle Assessment *of* Greenhouse Gas EMISSIONS *from* Plug-In Hybrid Vehicles

Energy-Efficient Urban Form

Short-Run Effects of a Price on CO_2 Emissions from U.S. Electric Generators

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Research

POLICY ANALYSIS

■ 3139

▶ Short Run Effects of a Price on Carbon Dioxide Emissions from U.S. Electric Generators

Adam Newcomer, Seth A. Blumsack, Jay Apt,* Lester B. Lave, and M. Granger Morgan

We develop a model to assess the magnitude of carbon dioxide emissions reductions from electric power generators in the short run due to a price on CO_2 emissions.

3145

Exposure Assessment of Carcass Disposal Options in the Event of a Notifiable Exotic Animal Disease: Application to Avian Influenza Virus

Simon J. T. Pollard, Gordon A. W. Hickman,* Phil Irving, Rupert L. Hough, Daniel M. Gauntlett, Simon F. Howson, Alwyn Hart, Paul Gayford, and Nick Gent

An exposure assessment for the hazards associated with poultry carcass disposal supports (i) intervention at source to minimize risk and (ii) an existing hierarchy of disposal options.

■ 3155

Health and Safety Practices in the Nanomaterials Workplace: Results from an International Survey

Joseph A. Conti, Keith Killpack, Gina Gerritzen, Leia Huang, Maria Mircheva, Magali Delmas, Barbara Herr Harthorn, Richard P. Appelbaum, and Patricia A. Holden*

This research regards risk beliefs and reported environmental health, safety, and product stewardship practices within surveyed industries and research labs either making or using nanomaterials.

■ 3163

Hybrid Life-Cycle Environmental and Cost Inventory of Sewage Sludge Treatment and End-Use Scenarios: A Case Study from China

Ashley Murray,* Arpad Horvath, and Kara L. Nelson

This research uses life-cycle inventory and economic analysis to assess nine sewage sludge treatment technologies along with the environmental offsets associated with three productive end use options.

■ 3170

Life Cycle Assessment of Greenhouse Gas Emissions from Plug-in Hybrid Vehicles: Implications for Policy

Constantine Samaras* and Kyle Meisterling

Electricity supply decisions within the next decade will affect the potential for large life cycle greenhouse gas emissions reductions with plug-in hybrids for several decades.

CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

3177

Lead Penetration and Leaching in a Complex Temperate Soil Profile

Malin E. Kylander, Antonio Martinez Cortizas, Sebastien Rauch, and Dominik J. Weiss*

The low Pb migration rates estimated in an acidic, complex soil suggest a mean residence time of the order of tens of thousands of years.

ENVIRONMENTAL PROCESSES

■ 3185

Evaluation of the Effects of Porous Media Structure on Mixing-Controlled Reactions Using Pore-Scale Modeling and Micromodel Experiments

Thomas W. Willingham, Charles J. Werth,* and Albert J. Valocchi

The effect of porous media structure on a transverse mixing-limited chemical reaction is evaluated using pore-scale numerical modeling and micromodel experiments.

■ 3194

***Bacillus subtilis* Bacteria Hinder the Oxidation and Hydrolysis of Fe^{2+} Ions**

Mohamad Fakih, Xavier Châtellier,* Mélanie Davranche, and Aline Dia

The reactive groups of bacterial cell walls and exuded molecules inhibit the oxidation and hydrolysis of Fe^{2+} cations at pH 6.5 through sorption processes.

■ 3201

Volatile Arsenic Species Released from *Escherichia coli* Expressing the AsIII S-adenosylmethionine Methyltransferase Gene

Chungang Yuan, Xiufen Lu, Jie Qin, Barry P. Rosen, and X. Chris Le*

Bacteria expressing the *arsM* gene release volatile trimethylarsine after incubation with inorganic arsenic species.

■ 3207

Sorption of Organic Contaminants by Carbon Nanotubes: Influence of Adsorbed Organic Matter

Xilong Wang, Jialong Lu, and Baoshan Xing*

Adsorbed organic matter reduces sorption of organic compounds by carbon nanotubes, and the reduction depends on organic matter property.

■ 3213

Temporal Trends of Polycyclic Aromatic Hydrocarbons in the U.K. Atmosphere: 1991–2005

Sandra N. Meijer,* Andrew J. Sweetman, Crispin J. Halsall, and Kevin C. Jones

Fifteen years of air monitoring data for PAHs at six U.K. sites show statistically significant decreasing concentrations at all locations.

■ 3219

Measurement and Modeling of Diel Variability of Polybrominated Diphenyl Ethers and Chlordanes in Air

Claudia Moeckel, Matthew MacLeod,* Konrad Hungerbühler, and Kevin C. Jones*

Short-term variations in ambient PBDE concentrations reflect reversible, temperature-controlled air-surface exchange and the influence of other underlying driving processes.

■ 3226

Haloacetic acid and Trihalomethane Formation from the Chlorination and Bromination of Aliphatic β-Dicarbonyl Acid Model Compounds

Eric R. V. Dickenson,* R. Scott Summers, Jean-Philippe Croué, and Hervé Gallard

Aliphatic β-dicarbonyl-acid-type structures within natural organic matter contribute to the significant formation of trihalomethanes and dihaloacetic acids observed after chlorination of natural waters.

■ 3234

Effect of Nitrate Reduction on the Microbial Reductive Transformation of Pentachloronitrobenzene

Didem Okutman Tas and Spyros G. Pavlostathis*

Nitrate reduction to nitric and nitrous oxides does not significantly affect the biotransformation of PCNB to PCA, but it does inhibit the sequential reductive dechlorination of PCA.

■ 3241

Investigation of the Kinetics and Mechanisms of the Oxidation of Cerussite and Hydrocerussite by Chlorine

Haizhou Liu, Gregory V. Korshin,* and John F. Ferguson

Chlorine oxidizes hydrocerussite and cerussite to lead dioxide via an autocatalytic process that is affected by the pH, carbonate, and chlorine concentrations.

■ 3248

Polychromatic UV Photon Irradiance Measurements Using Chemical Actinometers Based on NO_3^- and H_2O_2 Excitation: Applications for Industrial Photoreactors

Sara Goldstein* and Joseph Rabani

Actinometry based on NO_3^- is shown to be useful for large volumes of water in industrial high-intensity polychromatic UV photoreactors.

■ 3254

Adsorption and Cosorption of Tetracycline and Copper(II) on Montmorillonite as Affected by Solution pH

Yu-Jun Wang, De-An Jia, Rui-Juan Sun, Hao-Wen Zhu, and Dong-Mei Zhou*

The presence of copper(II) significantly affects the adsorption of TC on the montmorillonite.

■ 3260

Reductive Defluorination of Perfluorooctane Sulfonate

Valeria Ochoa-Herrera, Reyes Sierra-Alvarez,* Arpad Somogyi, Neil E. Jacobsen, Vicki H. Wysocki, and Jim A. Field

Branched PFOS isomers are reductively dehalogenated by the biomolecule vitamin B_{12}.

3265

Release of Isoprene and Monoterpenes during the Aerobic Decomposition of Orange Wastes from Laboratory Incubation Experiments

Xinming Wang* and Ting Wu

Measuring emissions only in anaerobic landfills may underestimate waste-related emissions because about 95% of emissions occur in the first 30 days, before conventional anaerobic landfilling.

3271

Relating Carbon Monoxide Photoproduction to Dissolved Organic Matter Functionality

Aron Stubbins,* Vesper Hubbard, Guenther Uher, Cliff S. Law, Robert C. Upstill-Goddard, George R. Aiken, and Kenneth Mopper*

Irradiation of DOM analogues (humic isolates and monomeric aromatics) indicates that CO photoproduction is driven by aromatic compounds, particularly those with electron donating ring substituents.

ENVIRONMENTAL MODELING

■ 3277

Modeling the Effect of Temperature on Bioaccumulation of Metals by a Marine Bioindicator Organism, *Mytilus edulis*

Stephen B. Baines* and Nicholas S. Fisher

Biokinetic modeling indicates that blue mussels accumulate certain metals more effectively at low temperatures typical of the Arctic than at warmer temperatures.

■ 3283

Midinfrared Spectroscopy and Chemometrics to Predict Diuron Sorption Coefficients in Soils

Mohsen Forouzangohar, Rai S. Kookana,* Sean T. Forrester, Ronald J. Smernik, and David J. Chittleborough

Midinfrared spectroscopy provides a direct estimation of diuron sorption in soils.

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Validation of Reactive Model Assumptions with Isotope Data: Application to the Dover Case

O. Atteia,* M. Franceschi, and A. Dupuy

The isotropic enrichment values of chlorinated solvents can be used to differentiate two models that give similar spatial distribution of CAH.

■ 3296

Chlorinated Polycyclic Aromatic Hydrocarbons in the Atmosphere: Seasonal Levels, Gas-Particle Partitioning, and Origin

Takeshi Ohura,* Shohoko Fujima, Takashi Amagai, and Miho Shinomiya

The seasonal levels, gas-particle partitioning, and origin of gaseous and particulate chlorinated polycyclic aromatic hydrocarbons in an urban air are investigated.

ENVIRONMENTAL MEASUREMENTS METHODS

■ 3303

Primary and Secondary Contributions to Ambient PM in the Midwestern United States

Michael Lewandowski,* Mohammed Jaoui, John H. Offenberg, Tadeusz E. Kleindienst, Edward O. Edney, Rebecca J. Sheesley, and James J. Schauer

Source apportionment is conducted on ambient aerosols from five cities using the chemical mass balance approach for primary contributions and an organic tracer-based technique for secondary contributions.

■ 3310

Emission Characteristics of Carbonaceous Particles from Various Residential Coal-Stoves in China

Guorui Zhi, Yingjun Chen,* Yanli Feng, Shengchun Xiong, Jun Li, Gan Zhang, Guoying Sheng, and Jiamo Fu

Emission factors are measured with various coal/stove combinations for residential sector use, and emission estimates of EC and BC are made using these emission factors.

3316

Using Aerosol Light Absorption Measurements for the Quantitative Determination of Wood Burning and Traffic Emission Contributions to Particulate Matter

Jisca Sandradewi, Andre S. H. Prévôt,* Sönke Szidat, Nolwenn Perron, M. Rami Alfarra, Valentin A. Lanz, Ernest Weingartner, and Urs Baltensperger

A linear regression model using a multiwavelength aethalometer is developed for the determination of traffic and wood burning particulate mass and validated by particulate ^{14}C analyses.

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3324
Identification of Nanobacteria in Human Arthritic Synovial Fluid by Method Validated in Human Blood and Urine using 200 nm Model Nanoparticles

Toshiyuki Tsurumoto, Dan Zhu, and Andrei P. Sommer*

A simple method for the rapid identification of nanobacteria (60–300 nm) and similarly sized synthetic nanoparticles in body fluids and environmental samples is introduced.

3329
▶ Measurement of Polybrominated Diphenyl Ethers on Hand Wipes: Estimating Exposure from Hand-to-Mouth Contact

Heather M. Stapleton,* Shannon M. Kelly, Joseph G. Allen, Michael D. McClean, and Thomas F. Webster

PBDE levels measured on hand wipe collections suggest hand-to-mouth contact is a significant exposure pathway to these flame-retardant chemicals.

■ 3335
Ab Initio and in Situ Comparison of Caffeine, Triclosan, and Triclocarban as Indicators of Sewage-Derived Microbes in Surface Waters

Thayer A. Young, Jochen Heidler, Cristina R. Matos-Pérez, Amir Sapkota, Tanikka Toler, Kristen E. Gibson, Kellogg J. Schwab, and Rolf U. Halden*

Hydrophobic organic wastewater compounds outperform caffeine as chemical tracers of sewage-derived microbes in surface waters due to their sorptive association with suspended microorganisms.

REMEDIATION AND CONTROL TECHNOLOGIES

■ 3341
Occurrence of Halogenated Furanones in U.S. Drinking Waters

Gretchen D. Onstad, Howard S. Weinberg,* and Stuart W. Krasner

The formation and stability of mutagenic halogenated furanones (MX-analogues) in drinking water is impacted by water treatment disinfectants, filtration media, and source water quality.

■ 3349
Ionic Strength and Composition Affect the Mobility of Surface-Modified Fe^0 Nanoparticles in Water-Saturated Sand Columns

Navid Saleh, Hye-Jin Kim, Tanapon Phenrat, Krzysztof Matyjaszewski, Robert D. Tilton, and Gregory V. Lowry*

Electrosteric repulsions from adsorbed polyelectrolytes inhibit deposition and increase Fe^0 nanoparticle mobility to 10s to 100s of meters in sand columns at groundwater ionic strength.

■ 3356
Enhanced Degradation of Tetrachloroethylene by Green Rusts with Platinum

Jeongyun Choi and Woojin Lee*

The reductive dechlorination of tetrachloroethylene by green rusts in the presence of Pt using a batch reactor system is studied.

■ 3363
Characterization and Reactivity of MnO_x Supported on Mesoporous Zirconia for Herbicide 2,4-D Mineralization with Ozone

Shengtao Xing, Chun Hu,* Jiuhui Qu,* Hong He, and Min Yang

Nonstoichiometrically, MnO_x was highly dispersed on mesoporous zirconia and shown to be highly effective for the mineralization of 2,4-D aqueous solution with ozone.

■ 3369
Preloading Hydrous Ferric Oxide into Granular Activated Carbon for Arsenic Removal

Min Jang, Weifang Chen,* and Fred S. Cannon

The preloading of HFO into a stable GAC offers the opportunity to employ fixed carbon bed reactors or point-of-use filters for arsenic removal.

■ 3375
Removal of Endocrine-Disrupting Chemicals during Ozonation of Municipal Sewage with Brominated Byproducts Control

Heqing Zhang, Harumi Yamada, and Hiroshi Tsuno*

The feasibility of EDC removal and brominated byproduct control during ozonation of original municipal sewage prior to biological treatment is investigated.

■ 3381
Particle-Size Dependent Sorption and Desorption of Pesticides within a Water–Soil–Nonionic Surfactant System

Peng Wang and Arturo A. Keller*

Soil properties, surfactant sorption, and pesticide sorption and desorption exhibit significant particle size dependence, making it key to understanding their relationship for decontaminating soils.

SUSTAINABILITY ENGINEERING AND GREEN CHEMISTRY

3388
Full Chain Energy Analysis of Biodiesel from *Jatropha curcas L.* in Thailand

Kritana Prueksakorn and Shabbir H. Gheewala*

The net energy balance of biodiesel production from *Jatropha curcas Linnaeus* in a life-cycle perspective in Thailand is investigated.

■ 3394
Anthropogenic Nickel Cycle: Insights into Use, Trade, and Recycling

Barbara K. Reck,* Daniel B. Müller, Katherine Rostkowski, and T. E. Graedel

Comprehensive nickel cycles for countries and regions around the planet chronicle nickel's uses, trade, recycling, and losses for the year 2000.

■ 3401
Hydrogen Production in a Single Chamber Microbial Electrolysis Cell Lacking a Membrane

Douglas Call and Bruce E. Logan*

Through the use of a graphite fiber brush anode, close electrode spacing, and a reactor lacking a membrane, hydrogen production rates via electrohydrogenesis are increased compared to those of previous studies.

ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH

CORRESPONDENCE AND REBUTTAL

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▶ **This research is highlighted in the News and Features section.**