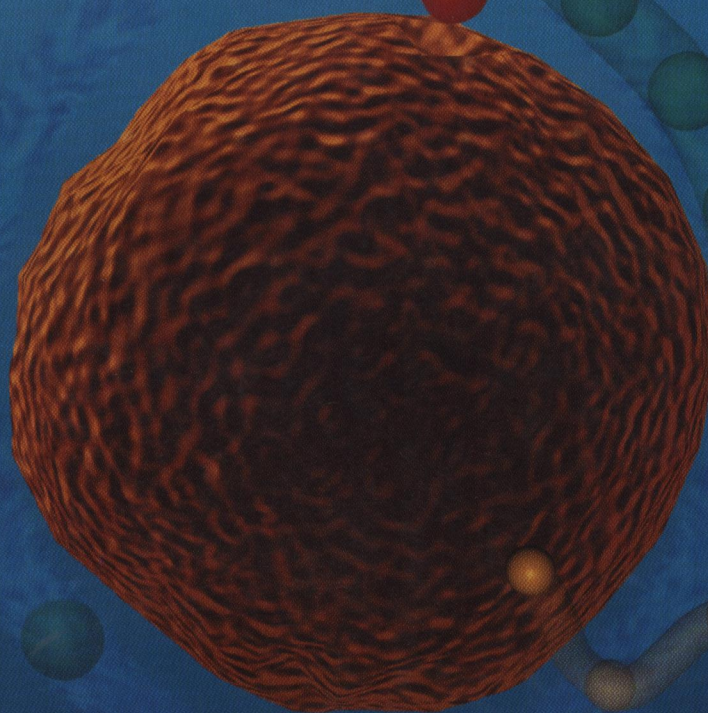


September 1, 2005

ENVIRONMENTAL Science & Technology

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Charles R. O'Melia: *Of Particles and Prose*

Quantifying Economic and Environmental
Benefits of Co-Located Firms

On-Site Production of Hydrogen
from Mineral Waste Oils

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THE AMERICAN
CHEMICAL SOCIETY

Coagulation and Particle/Surface Characterization

6337

Integral Water Treatment Plant Modeling: Improvements for Particle Processes

Desmond F. Lawler and Jeffrey A. Nason

Updated mathematical models are used to examine how particle size distributions change during flocculation and sedimentation.

6343

Comparison of Electrokinetic Properties of Colloidal Fullerenes ($n\text{-C}_{60}$) Formed Using Two Procedures

Jonathan Brant, Hélène Lecoanet, Matt Hotze, and Mark Wiesner

C_{60} fullerenes are produced through two different techniques: solvent exchange and extended mixing with water; both approaches produce $n\text{-C}_{60}$ aggregates that are negatively charged under various solution chemistries.

6352

Surface Charge Heterogeneities Measured by Atomic Force Microscopy

Patricia Taboada-Serrano, Viriya Vithayaveroj, Sotira Yiacoymi, and Costas Tsouris

Force-volume AFM is used to detect surface charge heterogeneities on silica surfaces generated by copper ion adsorption at various chemical compositions.

Particle Deposition and Colloid-Facilitated Transport

6361

Hierarchical Approach to Model Multilayer Colloidal Deposition in Porous Media

Pramod Kulkarni, R. Sureshkumar, and Pratim Biswas

This multiscale approach for predicting colloidal deposition combines kinetic information, which was obtained from mesoscopic stochastic simulations of particle deposition, with the macroscopic conservation equation describing colloidal transport.

6371

Differences between Chemisorbed and Physisorbed Biomolecules on Particle Deposition to Hydrophobic Surfaces

Michael B. Salerno, Sam Rothstein, Chisomaga Nwachukwu, Haithem Shelbi, Darrell Velegol, and Bruce E. Logan

Colloids that have chemisorbed biomolecules, compared with those that are bare or have physisorbed biomolecules, adhere more to both hydrophobic and hydrophilic glass packing beads.

6378

Colloid-Facilitated Transport of Strongly Sorbing Contaminants in Natural Porous Media: Mathematical Modeling and Laboratory Column Experiments

Daniel Grolimund and Michal Borkovec

A quantitative model is developed that includes release and deposition kinetics of colloids and adsorption/desorption of relevant ions to the solid matrix and suspended colloids.

■ 6387

Coupled Stream-Subsurface Exchange of Colloidal Hematite and Dissolved Zinc, Copper, and Phosphate

Notices to *ES&T* authors

1. Beginning immediately, *ES&T* will stringently enforce the 7000-word length limit for research manuscripts. Articles are expected to be clear, concise, and comprehensive (not a fragmented story). Manuscripts may exceed the 7000-word limit under highly unusual circumstances, but the length must be justified at submission. Lengthy papers risk being summarily declined. Tables and figures that augment the article but are otherwise unessential to the major themes must be placed in Supporting Information (which is freely accessible on the web). Authors should provide a word count in their cover letter. The count should include all text and references, and 300 words should be added for each figure and table. Large, multipart figures and extensive tables should be counted as 600 words.
2. We are pleased to inaugurate a new subject heading, Ecotoxicology and Human Environmental Health, in recognition of the emerging importance of this field and the increasing number of *ES&T* papers being submitted.
3. Submitted manuscripts must now include email addresses for all coauthors, in addition to full contact information for the corresponding author. Please also provide a list of at least four suggested reviewers and their contact information (email addresses are preferred).

Jianhong Ren and Aaron I. Packman

Laboratory experiments and numerical simulations investigate the coupled stream-subsurface exchange of colloidal hematite and dissolved zinc, copper, and phosphate.

Microbial Deposition and Adhesion

6395

Macro- and Nanoscale Observations of Adhesive Behavior for Several *E. coli* Strains (O157:H7 and Environmental Isolates) on Mineral Surfaces

J. B. Morrow, R. Stratton, H.-H. Yang, B. F. Smets, and D. Grasso

Biobarrier materials of varied surface characteristics are tested for *E. coli* adhesive capacity in macroscale, continuous-flow columns; their behavior is consistent with surface analyses.

6405

Influence of Growth Phase on Bacterial Deposition: Interaction Mechanisms in Packed-Bed Column and Radial Stagnation Point Flow Systems

Sharon L. Walker, Jeremy A. Redman, and Menachem Elimelech

The use of two experimental systems that capture different deposition mechanisms allows a better understanding of the role of growth phase and surface interactions in bacterial adhesion.

6412

Effect of Ferric Oxyhydroxide Grain Coatings on the Transport of Bacteriophage PRD1 and *Cryptosporidium parvum* Oocysts in Saturated Porous Media

R. A. Abudalo, Y. G. Bogatsu, J. N. Ryan, R. W. Harvey, D. W. Metge, and M. Elimelech

The deposition of a virus and a protozoan oocyst in saturated porous media strongly depends on the fraction of grain surfaces coated by ferric oxyhydroxides.

■ Supporting information is available free at <http://pubs.acs.org/est>.

Natural Organic Matter and Organic Macromolecules

■ 6420

Inhibition of Calcite Precipitation by Natural Organic Material: Kinetics, Mechanism, and Thermodynamics

Yi-Pin Lin, Philip C. Singer, and George R. Aiken

Inhibition of heterogeneous calcite precipitation by NOM is attributable to the adsorption of a NOM-Ca complex on the calcite surface.

■ 6429

Adsorption of Inorganic and Organic Ligands onto Hydrated Aluminum Oxide: Evaluation of Surface Charge and the Impacts on Particle and NOM Removal during Water Treatment

Peter Pommerenk and Gary C. Schafran

The adsorption of inorganic and organic ligands on aluminum hydroxide is examined in order to assess their influence on coagulation during drinking-water treatment.

■ 6435

Humic Substances Are Soft and Permeable: Evidence from Their Electrophoretic Mobilities

Jérôme F. L. Duval, Kevin J. Wilkinson, Herman P. van Leeuwen, and Jacques Buffle

Hydrodynamic permeabilities of three standard humic substances are determined from their electrophoretic mobilities, diffusion coefficients, and electric charge densities at several pH values and ionic strengths.

6446

Reduction of Disinfection Byproduct Formation by Molecular Reconfiguration of the Fulvic Constituents of Natural Background Organic Matter

Walter J. Weber, Jr., Qingguo Huang, and Roger A. Pinto

The molecular structures of model fulvic acids are increased and their associated disinfection byproduct formation potentials are decreased by enzyme-catalyzed oxidative coupling reactions.

■ 6453

Impact of Reclaimed Water on Select Organic Matter Properties of a Receiving Stream—Fluorescence and Perylene Sorption Behavior

R. David Holbrook, Jennifer Breidenich, and Paul C. DeRose

The fluorescence and macromolecular properties of organic matter in a receiving stream are influenced by highly treated reclaimed water during summer baseflow conditions.

Membrane Fouling and Characterization

6461

Direct Observation of Microbial Adhesion to Membranes

Sunny Wang, Greg Guillen, and Eric M. V. Hoek

Microscopic observation and an interfacial force model that can predict critical flux are used to understand and control microbial adhesion to polymeric ultrafiltration membranes.

6470

Initial Stages of Bacterial Fouling during Dead-End Microfiltration

Wendong Xu and Shankararaman Chellam

Early stages of bacterial fouling of microfilters follow the intermediate blocking law; the effectiveness of hydrodynamic backwashing procedures will be higher before new secretion of extracellular polymeric substances.

6477

Impact of Natural Organic Matter on Floc Size and Structure Effects in Membrane Filtration

Sangyun A. Lee, Anthony G. Fane, and T. David Waite

NOM produces tenuous flocs that are easily compressed in membrane filtration with resultant deleterious effects on membrane performance.

6487

Ion Implantation: Effect on Flux and Rejection Properties of NF Membranes

Joshua Olufemi Abitoye, Parna Mukherjee, and Kimberly Jones

Modified membranes containing implanted ions in their matrix induce a discrete, permanent charge in the active membrane layer, which allows for increased electrostatic repulsive forces.

Reactions and Sorption Phenomena at the Solid-Water Interface

6494

Heterogeneous Oxidation of Fe(II) on Ferric Oxide at Neutral pH and a Low Partial Pressure of O₂

Byungtae Park and Brian A. Dempsey

Both sorbed and dissolved Fe(II) are required for heterogeneous oxidation of Fe(II) on ferric oxide; this leads to the hypothesis that oxidation and reduction occur at separate sites.

■ 6501

Enhanced Coagulation for Satisfying the Arsenic Maximum Contaminant Level under Variable and Uncertain Conditions

Dominic L. Boccelli, Mitchell J. Small, and David A. Dzombak

An integrated process model that accounts for influent variability and parameter uncertainty is used to compare alternative enhanced coagulation approaches for removal of arsenic.

6508

Arsenic Removal Using Polymer-Supported Hydrated Iron(III) Oxide Nanoparticles: Role of Donnan Membrane Effect

Luis Cumbal and Arup K. SenGupta

An arsenic-selective, regenerable, hybrid sorbent is prepared by using the Donnan membrane principle.

■ 6516

Phenanthrene and Pyrene Sorption and Intraparticle Diffusion in Polyoxymethylene, Coke, and Activated Carbon

Sungwoo Ahn, David Werner, Hrissi K. Karapanagioti, Donald R. McGlothlin, Richard N. Zare, and Richard G. Luthy

Predictions of PAH diffusion into organic sorbents based on equilibrium and kinetic sorption experiments are compared with direct observations from $\mu\text{L}^2\text{MS}$.

■ 6527

Immobilization of Soot Particles in a Silica Matrix: A Sorbent-Carrier System for Studying Organic Chemical Sorption

Thanh H. Nguyen, Isam Sabbah, and William P. Ball

Development and verification of the soot-carrier approach are reported, with phenanthrene as a test sorbate, diatom-derived silica particles as the carrier phase, and four soots as sorbents.

■ Supporting information is available free at <http://pubs.acs.org/est>.
▶ This issue contains a news story about this research.

Policy Analysis

6535

► Quantifying Economic and Environmental Benefits of Co-Located Firms

Marian R. Chertow and D. Rachel Lombardi

The cyclical flow of resources among a set of co-located firms in Puerto Rico is shown to be environmentally and economically viable.

Characterization of Natural and Affected Environments

6542

2-Year Study of Chemical Composition of Bulk Deposition in a South China Coastal City: Comparison with East Asian Cities

K. M. Wai, P. A. Tanner, and C. W. F. Tam

From 1998 to 2000, bulk deposition was sampled daily in Hong Kong; the chemical composition is discussed.

6548

Chemical Recovery of Surface Waters Across the Northeastern United States from Reduced Inputs of Acidic Deposition: 1984–2001

Richard A. F. Warby, Chris E. Johnson, and Charles T. Driscoll

Lakes and ponds throughout the northeastern U.S. are experiencing modest increases in pH and acid-neutralizing capacity, the result of decreasing acid deposition.

6555

► Trifluoroacetate Profiles in the Arctic, Atlantic, and Pacific Oceans

B. F. Scott, R. W. Macdonald, K. Kannan, A. Fisk, A. Witter, N. Yamashita, L. Durham, C. Spencer, and D. C. G. Muir

Trifluoroacetate concentrations are lower in the Pacific than in the Atlantic or Arctic Oceans; deep-sea vents are shown to be sources.

6561

Are Neutral Chloroacetamide Herbicide Degradates of Potential Environmental Concern? Analysis and Occurrence in the Upper Chesapeake Bay

Michelle L. Hladik, Jonie J. Hsiao, and A. Lynn Roberts

Methods for GC/MS analysis of 20 infrequently studied neutral chloroacetamide herbicide degradates are presented and applied to a depth profile from the Upper Chesapeake Bay.

6575

Distribution of Aged ¹⁴C-PCB and ¹⁴C-PAH Residues in Particle-Size and Humic Fractions of an Agricultural Soil

Kieron J. Doick, Peter Burauel, Kevin C. Jones, and Kirk T. Semple

The inorganic component of soils apparently plays a significant role in the sequestration of PCBs 28 and 52 and PAHs fluoranthene and benzo[*a*]pyrene.

6584

Polycyclic Aromatic Hydrocarbons in the Atmosphere of the Eastern Mediterranean

Manolis Tsapakis and Euripides G. Stephanou

Off-shore measurements suggest that origin of air mass is the dominant factor determining atmospheric concentration levels of PAHs in the Eastern Mediterranean; particulate versus gas phase appears to be the most important parameter controlling their rate of removal from the atmosphere.

6591

Polyfluoroalkyl Compounds in Free-Ranging Bottlenose Dolphins (*Tursiops truncatus*) from the Gulf of Mexico and the Atlantic Ocean

Magali Houde, Randall S. Wells, Patricia A. Fair, Greg D. Bossart, Aleta A. Hohn, Teri K. Rowles, Jay C. Sweeney, Keith R. Solomon, and Derek C. G. Muir

The geographical trend of polyfluorinated compounds in plasma of free-ranging bottlenose dolphins from the Gulf of Mexico and the Atlantic Ocean is presented.

6599

Perfluorinated Sulfonamides in Indoor and Outdoor Air and Indoor Dust: Occurrence, Partitioning, and Human Exposure

Mahiba Shoeib, Tom Harner, Bryony H. Wilford, Kevin C. Jones, and Jiping Zhu

The role of indoor perfluorinated alkyl sulfonamides as a source to the outside is evaluated. Also discussed is the compound's partitioning in air and dust as well as the inhalation and ingestion of that dust.

Environmental Processes

6607

Determination of Mercury Complexation in Coastal and Estuarine Waters Using Competitive Ligand Exchange Method

Seunghee Han and Gary A. Gill

Concentrations of Hg(II) binding sites on natural dissolved organic matter and their conditional stability constants are determined in estuarine and coastal waters.

6616

Changes in Zinc Speciation in Field Soil after Contamination with Zinc Oxide

Andreas Voegelin, Sabina Pfister, Andreas C. Scheinost, Matthew A. Marcus, and Ruben Kretzschmar

ZnO dissolves in less than a year in a contaminated field soil; half of the zinc forms a new precipitate of mostly the layered double hydroxide type.

6624

Infrared Spectroscopic Evidence Supporting Heterogeneous Site Binding Models for Humic Substances

David G. Lumsdon and Anthony R. Fraser

FTIR spectroscopic data of soil humic substances in aqueous solutions provides physical evidence supporting the basis of the NICA-Donnan model and its generic parameters.

6632

Sorption of a Diverse Set of Organic Vapors to Diesel Soot and Road Tunnel Aerosols

Christine M. Roth, Kai-Uwe Goss, and René P. Schwarzenbach

For diesel soot, adsorption to elemental carbon dominates, whereas sorption is governed by adsorption to both elemental carbon and organic matter for aerosols in road tunnels.

6638

Sorption of a Diverse Set of Organic Vapors to Urban Aerosols

Christine M. Roth, Kai-Uwe Goss, and René P. Schwarzenbach

Data evaluated with poly-parameter linear free energy relationships that take into account intermolecular interactions indicate that sorption to two urban aerosols is dominated by absorption into organic matter.

6644

Sulfide Species as a Sink for Mercury in Lake Sediments

Steven Wolfenden, John M. Charnock, John Hilton, Francis R. Livens, and David J. Vaughan