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News

Mike Sharpe provides a summary of the latest environmental news, literature and legislation.

THEMED ISSUE: ENVIRONMENTAL NANOTECHNOLOGY

EDITORIAL

1131

Environmental nanotechnology

Wunmi Sadik

Wunmi Sadik introduces this themed issue on environmental nanotechnology.

Contributors to the Environmental Nanotechnology themed issue

Journal of Environmental Monitoring profiles the contributors to the Environmental Nanotechnology themed issue.

CRITICAL REVIEWS

1135

The devil is in the details (or the surface): impact of surface structure and surface energetics on understanding the behavior of nanomaterials in the environment

Imali A. Mudunkotuwa and Vicki H. Grassian*

Nanomaterial surfaces are driving forces in many environmental processes yet surface structure and energetics are often poorly understood.

1145

The release of engineered nanomaterials to the environment

Fadri Gottschalk and Bernd Nowack*

Very little quantitative information is available about the release of nanomaterials from products to the environment.

1156

Origin, separation and identification of environmental nanoparticles: a review

Tsung M. Tsao, Yue M. Chen and Ming K. Wang*

Flow chart for the dispersion and separation of ENPs by an automated ultrafiltration device.

The antibacterial effects of engineered nanomaterials: implications for wastewater treatment plants

Ndeke Musee,* Melusi Thwala and Nomakhwezi Nota

This review critically evaluates the existing knowledge on engineered nanomaterials (ENMs) as a potential threat to the bacteria populations in wastewater treatment plants (WWTPs).

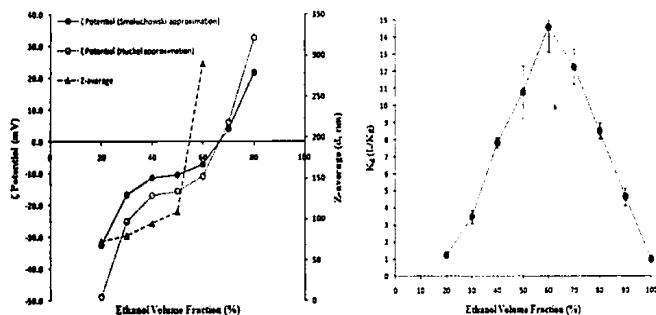
1184

Inside the radar: select elements in nanomaterials and sustainable nanotechnology

Barbara Karn*

Nanomaterials containing rare earth elements and uncommon metals are incorporated into commercial products with little attention to their environmental sustainability.

1190



Sorption of nano-C₆₀ clusters in soil: hydrophilic or hydrophobic interactions?

Mohsen Forouzangohar and Rai S. Kookana*

Colloidal properties of fullerene nanoparticles (nC₆₀) govern their sorption in soil rather than the hydrophobic interactions expected from their low solubility in water.

1195

Occurrence and removal of titanium at full scale wastewater treatment plants: implications for TiO₂ nanomaterials

Paul Westerhoff,* Guixue Song, Kiril Hristovski and Mehlika A. Kiser

Titanium concentrations in effluents from 10 full-scale wastewater treatment plants ranged from <2 to 21 μg L⁻¹, and a roto-evaporation isolation method facilitated visual confirmation of titanium oxide nanomaterials.

1204

Translocation of Sb and Ti in an undisturbed floodplain soil after application of Sb₂O₃ and TiO₂ nanoparticles to the surface

Lars Duester,* Carsten Prasse, Julia V. Vogel, Jos P. M. Vink and Gabriele E. Schaumann

The pore water transport of Ti and Sb applied as TiO₂ and Sb₂O₃ nanoparticles to an undisturbed floodplain soil was examined.

1212

Challenges for physical characterization of silver nanoparticles under pristine and environmentally relevant conditions

Robert I. MacCuspie,* Kim Rogers,* Manomita Patra, Zhiyong Suo, Andrew J. Allen, Matthew N. Martin and Vincent A. Hackley

Silver nanoparticles identical in name can have widely different size distributions, depending upon the measurement conditions and techniques used. Details of characterizing AgNPs enables comparison of results across environmental assays.

1227

Effects of silver and cerium dioxide micro- and nano-sized particles on *Daphnia magna*

Birgit K. Gaiser,* Anamika Biswas, Philipp Rosenkranz, Mark A. Jepson, Jamie R. Lead, Vicki Stone, Charles R. Tyler and Teresa F. Fernandes

In acute and chronic exposures of *D. magna*, Ag particles were highly toxic, whereas CeO₂ nanoparticles caused few adverse effects.

1236

Environmental applications of poly(amic acid)-based nanomaterials

Veronica A. Okello, Nian Du, Boling Deng and Omowunmi A. Sadik*

PAA binds, removes and detoxifies (a) silver nanoparticles, (b) chromium(VI) solutions.

Molecular-level methods for monitoring soil organic matter responses to global climate change

Xiaojuan Feng* and Myrna J. Simpson*

This review highlights the use of complementary molecular-level methods (biomarkers and nuclear magnetic resonance (NMR)) for ascertaining SOM responses to various environmental changes.

PAPERS

The biogeochemistry of arsenic in a remote UK upland site: trends in rainfall and runoff, and comparisons with urban rivers

A. P. Rowland,* C. Neal, B Reynolds, H. P. Jarvie, D. Sleep, A. J. Lawlor and M. Neal

Arsenic concentrations in the headwater streams of the Severn, draining acid moorland, are extremely low and always less than $1 \mu\text{g L}^{-1}$.

Proximity analysis of air pollution exposure and its potential risk

Sarawut Thepanondh* and Wassana Toruksa

Proximity analysis and spatial variability of the ambient nitrogen dioxide (NO_2) concentration in Rayong province, Thailand, were analyzed using geostatistics and spatial modeling techniques.

Formation and modeling of disinfection by-products in drinking water of six cities in China

Bixiong Ye, Wuyi Wang,* Linsheng Yang, Jianrong Wei and Xueli E

A comprehensive investigation of DBPs was undertaken and an ANN model was developed for DBP formation in the drinking water of six cities in China.

Levels and chemical composition of PM in a city near a large Cu-smelter in Spain

A. M. Sánchez de la Campa, * J. de la Rosa, Y. González-Castanedo, R. Fernández-Camacho, A. Alastuey, X. Querol, A. F. Stein, J. L. Ramos, S. Rodríguez, I. García Orellana and S. Nava

Cu-smelters contribute high concentrations of heavy metals in the air. High arsenic concentrations derived from Cu-smelter emission occur in short time. Dispersion modelling displays geographical distribution of the As particulate.

An assessment of persistent organic pollutants in Scottish coastal and offshore marine environments

Lynda Webster, * Marie Russell, Pam Walsham, Lesley A. Phillips, Ines Hussy, Gill Packer, Eric J. Dalgarno and Colin F. Moffat

Spatial and temporal trends of persistent organic pollutants in Scottish marine sediments and fish liver were investigated. The significance of the contaminant concentrations was assessed using a traffic light system.

Predatory aquatic beetles, suitable trace elements bioindicators

Carmen I. Burghilea, * Dragos G. Zaharescu, Peter S. Hooda and Antonio Palanca-Soler

The suitability of predatory aquatic beetles to bioindicate trace elements in aquatic environments is revealed by a novel statistical approach.

Contrasting temporal trends and relationships of total organic carbon, black carbon, and polycyclic aromatic hydrocarbons in rural low-altitude and remote high-altitude lakes

Christian Bogdal, * Thomas D. Bucheli, Tripti Agarwal, Flavio S. Anselmetti, Franziska Blum, Konrad Hungerbühler, Martin Kohler, Peter Schmid, Martin Scheringer and Anna Sobek

Sources and fate of combustion-derived anthropogenic air pollutants investigated in sub-Alpine and high-Alpine lakes.

1327

Actinides and decay products in selected produce and bioindicators in the vicinity of a uranium plant

L. Pourcelot,* B. Boulet, C. Le Corre, A. de Vismes Ott, X. Cagnat, J. Loyen, C. Fayolle, W. Van Hecke, B. Martinez, J. Petit, R. Kaltenmeier and R. Gieré

We report data for the activity of U, its daughters, and some artificial radionuclides in a bioindicator and selected produce sampled near a uranium facility.

1337

Use of pharmaceuticals and pesticides to constrain nutrient sources in coastal groundwater of northwestern Long Island, New York, USA

Sherry Zhao, Pengfei Zhang,* John Crusius, Kevin D. Kroeger and John F. Bratton

We examine the potential of using organic tracers (pharmaceutical residuals and pesticides) to distinguish groundwater nitrogen derived from septic systems from nitrogen derived from lawn fertilizers.

1344

Inhibitor resistance and *in situ* capability of nanoparticle based gene quantification

Gha-Young Kim, Xiaofang Wang and Ahjeong Son*

In situ monitoring capability of inhibitor resistant gene quantification assay using magnetic bead (MB) and quantum dot (QD) nanoparticle for the detection of *E. coli* O157:H7.

1351

Measurements of gaseous mercury exchanges at the sediment–water, water–atmosphere and sediment–atmosphere interfaces of a tidal environment (Arcachon Bay, France)

Sylvain Bouchet, Emmanuel Tessier, Mathilde Monperrus, Romain Bridou, Jacques Clavier, Gerard Thouzeau and David Amouroux*

This study evaluates the intensity of the gaseous mercury exchanges at the sediment–water, water–atmosphere and sediment–atmosphere interfaces of a tidal environment.

Ecotoxicological assessment of acid mine drainage: electrophysiological changes in earthworm (*Aporrectodea caliginosa*) and aquatic oligochaete (*Lumbriculus variegatus*)

Ravi Gooneratne,* Andreas Buser, Phil Lindsay and Martin Wellby

The ecological health of 15 sites in two mining areas on the West Coast of the South Island, New Zealand, was assessed using a non-invasive electrophysiological technique.

Occurrence and removal efficiencies of eight EDCs and estrogenicity in a STP

Zhaohan Zhang, Yujie Feng,* Peng Gao, Ce Wang and Nanqi Ren

This research aims to investigate the concentrations and removal efficiencies of eight EDCs in a traditional STP during different seasons.

Advanced REACH Tool (ART): Calibration of the mechanistic model

Jody Schinkel,* Nicholas Warren, Wouter Fransman, Martie van Tongeren, Patricia McDonnell, Eef Voogd, John W. Cherrie, Martin Tischer, Hans Kromhout and Erik Tielemans

This paper presents the calibration of the mechanistic model of the first higher tier exposure assessment tool referred to as the Advanced REACH Tool (ART).

Soils and sediments of the Thua Thien-Hue Province (central Vietnam): recognizing trace element sources and the likely influence of natural events

Silvia Giuliani,* Stefania Romano, Clara Turetta, Nguyen Huu Cu, Luca Giorgio Bellucci, Gabriele Capodaglio, Cristian Mugnai, Dang Hoai Nhon and Mauro Frignani

Recognizing contaminant sources and the influence of natural events is essential for the proper management of natural resources: the Thua Thien-Hue province as a case study.

Organophosphates in aircraft cabin and cockpit air—method development and measurements of contaminants

Kasper Solbu,* Hanne Line Daae, Raymond Olsen, Syvert Thorud, Dag Gunnar Ellingsen, Torsten Lindgren, Berit Bakke, Elsa Lundanes and Paal Molander

Organophosphates originating from turbine and hydraulic oils have been detected in aircraft cabin and cockpit air during commercial flights.

Solid-phase extraction using hierarchical organosilicates for enhanced detection of nitroenergetic targets

Brandy J. Johnson,* Brian J. Melde, Iwona A. Leska, Paul T. Charles and Alan D. Hewitt

The macroscale structure of the organosilicates allows rapid diffusion of targets to the organized mesoscale structure. Diethylbenzene bridging-groups in the material enhance target binding characteristics.

Plants as bio-monitors for Cs-137, Pu-238, Pu-239,240 and K-40 at the Savannah River Site

Eric Frank Caldwell, Martine C. Duff,* Caitlin E. Ferguson and Daniel P. Coughlin

Vegetation as bio-monitors offer insight into the behavior and bio-availability of radioactive contaminants in the environment.

Monitoring of Cr, Cu, Pb, V and Zn in polluted soils by laser induced breakdown spectroscopy (LIBS)

Marcella Dell'Aglio, Rosalba Gaudiuso, Giorgio S. Senesi, Alessandro De Giacomo, Claudio Zaccone,* Teodoro M. Miano and Olga De Pascale

Laser Induced Breakdown Spectroscopy is a fast and multi-elemental analytical technique that can be successfully used for metal monitoring in soils. In this work, a simple method for the estimation of the soil pollution degree by heavy metals, based on the determination of the anthropogenic index, was proposed and determined for Cr and Zn.

***In situ* polar organic chemical integrative sampling (POCIS) of steroidal estrogens in sewage treatment works discharge and river water**

Thitima Rujiralai, Ian D. Bull, Neville Llewellyn and Richard P. Evershed*

Passive organic chemical integrative sampling (POCIS) is a viable and non-preferential method of determining time averaged estrogen concentrations in the aquatic environment.

Statistical analysis of trends in organic pollution and pollution by nutrients at selected Danube river stations

Daniela Jaruskova* and Igor Liska

The paper demonstrates an application of statistical methods not sensitive to departures from normality to detection of trends in water pollution in the Danube river taking into account the influence of the river discharge as well.

Heavy metals and organochlorinated compounds in the European eel (*Anguilla anguilla*) from the Adour estuary and associated wetlands (France)

H. Tabouret, G. Bareille,* A. Mestrot, N. Caill-Milly, H. Budzinski, L. Peluhet, P. Prouzet and O. F. X. Donard

Effluents with high ratio \sum PCB to \sum CB (28, 52) largely impact eels muscle in the downstream estuary.

Distribution, sources, and potential toxicological significance of PAHs in drinking water sources within the Pearl River Delta

Taicheng An,* Meng Qiao, Guiying Li, Hongwei Sun, Xiangying Zeng and Jiamo Fu

Distribution and sources of PAHs were investigated in drinking water sources within the Pearl River Delta. Risk assessment suggested that individual PAHs in all samples within this region did not pose non-cancerous or cancerous hazards to human health.

Effects of fulvic substances on the distribution and migration of Hg in landfill leachate

Chai Xiaoli,* Liu Guixiang, Wu Jun, Tong Huanhuan, Ji Rong and Zhao Youcai

The abiotic association of Hg(II) by dissolved HS in landfill leachate, which remains largely unexplored, is studied in this paper.

Spatio-temporal variability of solid, total dissolved and labile metal: passive vs. discrete sampling evaluation in river metal monitoring

Cindy Priadi, Adeline Bourgeault, Sophie Ayrault,* Catherine Gourlay-Francé, Marie-Hélène Tusseau-Vuillemin, Philippe Bonté and Jean-Marie Mouchel

The comparison of discrete solid/dissolved metal concentration and time-integrated solid/labile metal concentration demonstrated the capability of time-integrated concentration index to represent significant spatio-temporal trends in metal variation.

Utilization of the solid sorbent media in monitoring of airborne cyclophosphamide concentrations and the implications for occupational hygiene

Pavel Odraska,* Lenka Dolezalova, Pavel Piler, Michal Oravec and Ludek Blaha

The study demonstrates good applicability of SPE sorbent based on styrene divinylbenzene polymer for the determination of gaseous cyclophosphamide.

Environmental implications of material leached from coal

Stanley Moyo, Munyaradzi Mujuru, Rob I. McCrindle* and Ntebogeng Mokgalaka-Matlala

Samples of bituminous coal from Witbank were column leached with water of pH 2.0, 4.0 and 6.0 to model the washing of metals from coal into surface and groundwater in Witbank coalfields.

A large scale survey of trace metal levels in coastal waters of the Western Mediterranean basin using caged mussels (*Mytilus galloprovincialis*)

José Benedicto,* Bruno Andral,
Concepción Martínez-Gómez, Carlos Guitart,
Salud Deudero, Alessandro Cento, Alfonso Scarpato,
Josep Caixach, Samir Benbrahim, Lassaad Chouba,
Mostefa Boulahdid and François Galgani

An assessment of trace metal contamination (Hg, Cd, Pb and Ni) reveals new areas of concern along the Western Mediterranean Sea.