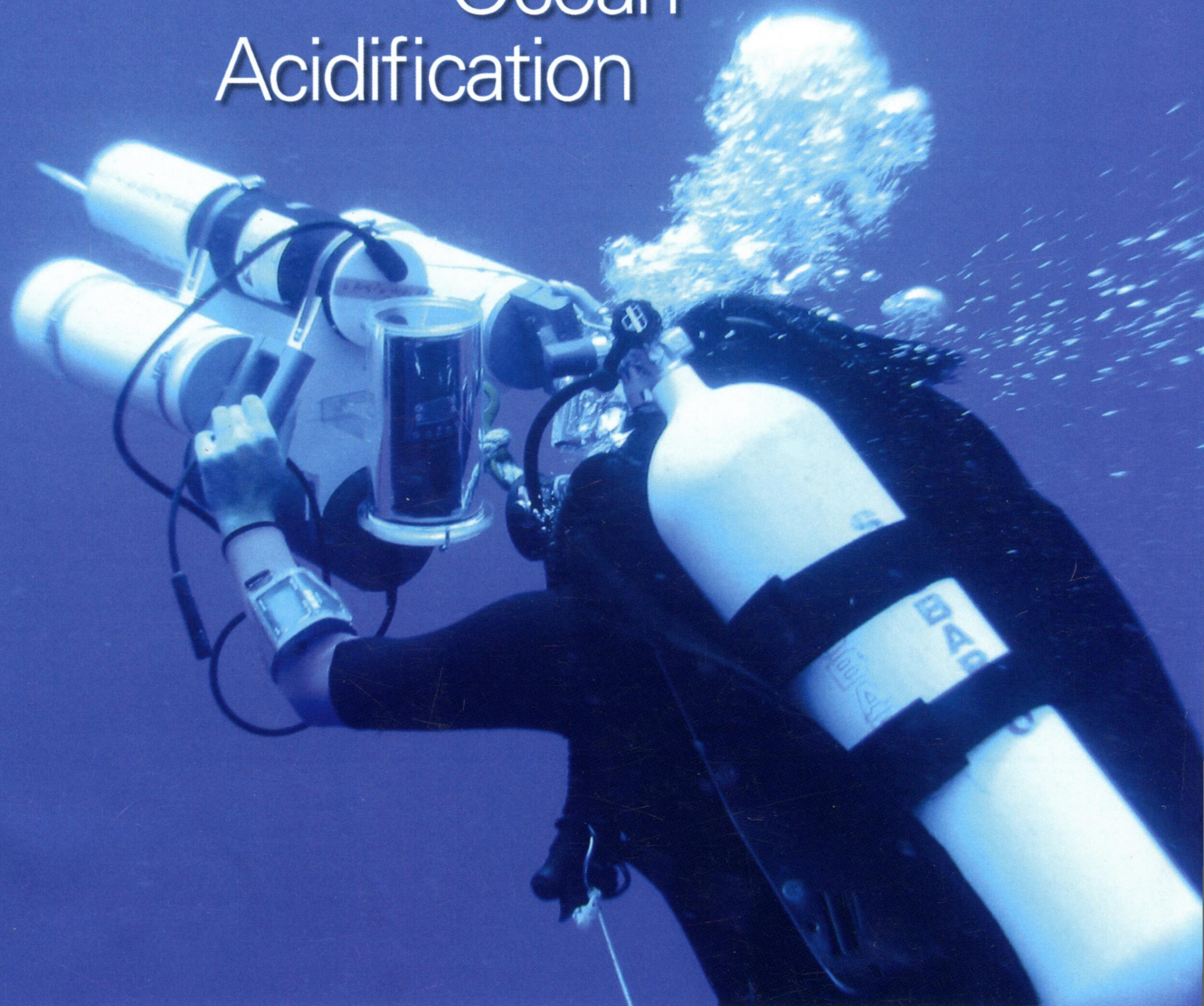


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Measuring
Ocean
Acidification



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ON THE COVER: A major portion of the atmosphere's rapidly growing inventory of carbon dioxide enters the oceans, increasing seawater acidity and altering the chemistries of life-essential elements. This issue's Feature article reviews chemical consequences of ocean carbonation and acidification, describes current methods for observing seawater acid–base equilibria, and highlights the promise of autonomous in situ technologies for observing today's evolving ocean chemistry.

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When the Well Runs Dry

Jerald L. Schnoor*

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Measuring Ocean Acidification: New Technology for a New Era of Ocean Chemistry

Robert H. Byrne*

Human additions of carbon dioxide to the atmosphere are creating a cascade of chemical consequences that will eventually extend to the bottom of all the world's oceans. Among the best-documented seawater effects are a worldwide increase in open-ocean acidity and large-scale declines in calcium carbonate saturation states. The susceptibility of some young, fast-growing calcareous organisms to adverse impacts highlights the potential for biological and economic consequences. Many important aspects of seawater CO₂ chemistry can be only indirectly observed at present, and important but difficult-to-observe changes can include shifts in the speciation and possibly bioavailability of some life-essential elements. Innovation and invention are urgently needed to develop the in situ instrumentation required to document this era of rapid ocean evolution. Human additions of carbon dioxide to the atmosphere are creating a cascade of chemical consequences that will eventually extend to the bottom of all the world's oceans. Among the best-documented seawater effects are a worldwide increase in open-ocean acidity and large-scale declines in calcium carbonate saturation states. The susceptibility of some young, fast-growing calcareous organisms to adverse impacts highlights the potential for biological and economic consequences. Many important aspects of seawater CO₂ chemistry can be only indirectly observed at present, and important but difficult-to-observe changes can include shifts in the speciation and possibly bioavailability of some life-essential elements. Innovation and invention are urgently needed to develop the in situ instrumentation required to document this era of rapid ocean evolution.

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5770  [dx.doi.org/10.1021/es404122y](https://doi.org/10.1021/es404122y)

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Mechanisms of Toxicity of Hydroxylated Polybrominated Diphenyl Ethers (HO-PBDEs) Determined by Toxicogenomic Analysis with a Live Cell Array Coupled with Mutagenesis in *Escherichia coli*
Guanyong Su, Hongxia Yu,* Michael H. W. Lam, John P. Giesy, and Xiaowei Zhang*

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Toward Tailored Functional Design of Multi-Walled Carbon Nanotubes (MWNTs): Electrochemical and Antimicrobial Activity Enhancement via Oxidation and Selective Reduction
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Bioaccumulation and Trophic Transfer of Short Chain Chlorinated Paraffins in a Marine Food Web from Liaodong Bay, North China

Xindong Ma, Haijun Zhang, Zhen Wang, Ziwei Yao, Jingwen Chen,* and Jiping Chen*


Energy and the Environment

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Navigating Wastewater Energy Recovery Strategies: A Life Cycle Comparison of Anaerobic Membrane Bioreactor and Conventional Treatment Systems with Anaerobic Digestion

Adam L. Smith, Lauren B. Stadler, Ling Cao, Nancy G. Love, Lutgarde Raskin, and Steven J. Skerlos*

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Spatially Explicit Methane Emissions from Petroleum Production and the Natural Gas System in California

Soungeun Jeong,* Dev Millstein, and Marc L. Fischer

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Water Intensity Assessment of Shale Gas Resources in the Wattenberg Field in Northeastern Colorado

Stephen Goodwin,* Ken Carlson, Ken Knox, Caleb Douglas, and Luke Rein

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Decomposition of Nitrosamines in CO₂ Capture by Aqueous Piperazine or Monoethanolamine

Nathan A. Fine, Paul T. Nielsen, and Gary T. Rochelle*

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[dx.doi.org/10.1021/es405210d](https://doi.org/10.1021/es405210d)

No Catalyst Addition and Highly Efficient Dissociation of H₂O for the Reduction of CO₂ to Formic Acid with Mn

Lingyun Lyu, Xu Zeng, Jun Yun, Feng Wei, and Fangming Jin*

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Reducing Emissions of Persistent Organic Pollutants from a Diesel Engine by Fueling with Water-Containing Butanol Diesel Blends

Yu-Cheng Chang, Wen-Jhy Lee,* Hsi-Hsien Yang, Lin-Chi Wang,* Jau-Huai Lu, Ying I. Tsai, Man-Ting Cheng, Li-Hao Young, and Chia-Jui Chiang

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Glycerol Etherification with TBA: High Yield to Poly-Ethers Using a Membrane Assisted Batch Reactor

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Black Carbon Emissions in Gasoline Exhaust and a Reduction Alternative with a Gasoline Particulate Filter

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Integrated Evaluation of Cost, Emissions, and Resource Potential for Algal Biofuels at the National Scale

Ryan E. Davis, Daniel B. Fishman, Edward D. Frank,* Michael C. Johnson, Susanne B. Jones, Christopher M. Kinchin, Richard L. Skaggs, Erik R. Venteris, and Mark S. Wigmosta

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Enrichment of Ventilation Air Methane (VAM) with Carbon Fiber Composites

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Comment on "Sulfidation of Silver Nanoparticles: Natural Antidote to Their Toxicity"

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Response to Comment on "Sulfidation of Silver Nanoparticles: Natural Antidote to Their Toxicity"

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Additions and Corrections

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Correction to Applicability of Passive Sampling to Bioanalytical Screening of Bioaccumulative Chemicals in Marine Wildlife

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