

NWRI Expert Panel for the California Department of Public Health

CV for Proposed Expert Panel Member:

- Professor Dr.-Ing. Jörg Drewes

Professor Dr.-Ing. JÖRG E. DREWES

Chair of Urban Water Systems Engineering, Technische Universität München, 85748 Garching, Germany
Phone: +49 (0)89 289 13713 E-mail: jdrewes@tum.de

EDUCATION

Doctorate in Environmental Engineering (Ph.D.), Technical University of Berlin, Germany 1997

Dipl. Ing. Environmental Engineering (M.S.), Technical University of Berlin, Germany 1992

EXPERIENCE

8/2013-present: **Chair Professor**, Chair of Urban Water Systems Engineering, Technische Universität München.

8/2013-present: **Research Professor**, Civil and Environmental Engineering, Colorado School of Mines, Golden CO.

8/2011-7/2013: **Director of Research**, NSF Engineering Research Center on Reinventing the Nation's Urban Water Infrastructure (ReNUWIt), Stanford, UC-Berkeley, New Mexico State University and Colorado School of Mines.

3/2010-7/2013: **Professor**, Civil and Environmental Engineering, Colorado School of Mines, Golden CO.

Co-Director, Advanced Water Technology Center (AQWATEC).

8/2010-8/2013: **Visiting Professor**, Water Desalination and Reuse Center (WDRC), King Abdullah University of Science and Technology, Thuwal, Saudi-Arabia.

7/2007-present: **Adjunct Professor**, UNSW Water Research Centre, The University of New South Wales, Sydney, Australia.

4/2006-3/2010: **Associate Professor**, Environmental Science and Engineering Division, Colorado School of Mines, Golden CO.

8/2001-4/2006: **Assistant Professor**, Environmental Science and Engineering Division, Colorado School of Mines, Golden CO.

9/1999-7/2001: **Associate Director**, National Center for Sustainable Water Supply (NCSWS), Arizona State University, Tempe, AZ, USA

8/1997-8/1999: **Visiting Professor**, Arizona State University, Tempe, AZ, USA

7/1992-7/1997: **Research Associate**, Technical University of Berlin, Germany.

RESEARCH INTEREST

Energy efficient water and wastewater treatment engineering; energy recovery from waste streams; distributed water reuse and remotely operated treatment; potable reuse; monitoring strategies and treatment performance assessments; novel design approaches for natural treatment systems (riverbank filtration, aquifer recharge and recovery); state-of-the-art characterization of natural and effluent organic matter and emerging trace organic chemicals (endocrine disrupting compounds, pharmaceutical residues, household chemicals) in natural and engineered systems.

AWARDS and HONORS

Chair, International Water Association (IWA) Water Reuse Specialist Group; Panel Member, National Research Council (NRC) on Gray Water Reuse 2013-2015; Panel Member, National Research Council (NRC) on Water Reuse 2008-2011; Member, Research Advisory Council WaterReuse Foundation (WRF); Chair, Science Advisory Committee on Compounds of Emerging Concern in Recycled Water, California State Water Resources Control Board; American Water Works Association Rocky Mountain Section Outstanding Research Award, 2007; Dr. Nevis Cook Graduate Teaching Award, Colorado School of Mines, 2003. Quentin Mees Research Award for outstanding water-related environmental research in the State of Arizona, 1999. Research Scholarship administered by the Deutsche Forschungsgemeinschaft (DFG), 1997 – 1999. Willy-Hager Award for outstanding research in the field of water and wastewater treatment, Germany, 1997.

PUBLICATIONS (Selection)

Papers in peer-reviewed journals

Drewes, J. E. & Jekel, M. (1996). Simulation of Groundwater Recharge With Advanced Treated Wastewater, *Water Science & Technology* **33**, 10-11, 409-418.

Drewes, J. E., Bornhardt, C. & Jekel, M. (1996). Adsorption characteristics of municipal wastewater during biological treatment and subsequent soil infiltration. *Vom Wasser* **86**, 43-55 (in German).

Bornhardt, C., Drewes, J. E. & Jekel, M. (1997). Removal of organic halogens (AOX) from municipal wastewater by powdered activated carbon (PAC)/activated sludge (AS) treatment. *Water Science & Technology* **35**, 10, 147-153.

Drewes, J. E. & Jekel, M. (1997). Investigation of competing adsorption of organic solutes in domestic wastewater. *Vom Wasser* **89**, 97-114 (in German).

Drewes, J. E. & Jekel, M. (1998). Behavior of DOC and AOX using advanced treated wastewater for groundwater recharge. *Water Research* **32**, 10, 3125-3133.

Drewes, J. E. & Weigert, B. (1998). Sustainable Development – A new approach for public water supply! *gwf Wasser/Abwasser* **139**, 11, 699-705 (in German).

Bouwer, H., Fox, P., Westerhoff, P. & Drewes, J.E. (1999). Integrating water management and re-use: causes for concern? *Water Quality International*, Jan/Feb, 19-22.

- Drewes, J.E., Sprinzl, M., Soellner, A., Williams, M, Fox, P. & Westerhoff, P. (1999). Tracking Residual Dissolved Organic Carbon using XAD-Fractionation and ¹³C-NMR Spectroscopy in Indirect Potable Reuse Systems. *Vom Wasser* **93**, 95-107.
- Drewes, J.E. & Fox, P. (1999). Fate of natural organic matter (NOM) during groundwater recharge using reclaimed water. *Water Science & Technology* **40**, 9, 241-248.
- Drewes, J.E. & Fox, P. (1999). Behavior and characterization of residual organic compounds in wastewater used for indirect potable reuse. *Water Science & Technology* **40**, 4-5, 391-398.
- Drewes, J.E. & Fox, P. (2000). Effect of drinking water sources on reclaimed water quality in water reuse systems. *Water Environment Research* **72**, 3, 353-362.
- Fox, P., Narayanaswamy, K., Genz, A., and Drewes, J. E. (2000). Water quality transformations during soil-aquifer treatment at the Mesa Northwest Water Reclamation Plant, USA. *Water Science & Technology* **43** (10), 343-350.
- Drewes, J.E., Fox, P. & Jekel, M. (2001). Occurrence of iodinated X-ray contrast media in domestic effluents and their fate during indirect potable reuse. *Journal of Environmental Science and Health, Part A* **36A**, 1633-1645.
- Drewes, J. E. & Fox, P. (2001). Source Water Impact Model (SWIM) – A new planning tool for indirect potable water reuse systems. *Water Science & Technology* **43** (10), 267-275.
- Fox, P. & Drewes, J. E. (2001). Monitoring Requirements for Groundwater Under the Influence of Reclaimed Water. *Journal of Environmental Assessment and Monitoring* **70**, 117-133.
- Drewes, J. E. & Croue, J.-P. (2002). New approaches for structural characterization of organic matter in drinking water and wastewater effluents. *Water Science & Technology – Water Supply* **2**, 2, 1-10.
- Drewes, J. E., Heberer, T. & Reddersen, K. (2002). Fate of pharmaceuticals during indirect potable reuse. *Water Science & Technology* **46**, 3, 73-80.
- Drewes, J. E., Heberer, T., Rauch, T. & Reddersen, K. (2003). Fate of pharmaceuticals during groundwater recharge. *J. Ground Water Monitoring and Remediation* **23**, 3, 64-72.
- Drewes, J. E., Reinhard, M., & Fox, P. (2003). Comparing microfiltration-reverse osmosis and soil-aquifer treatment for indirect potable reuse of water. *Water Research* **37**, 3612-3621.
- Montgomery-Brown, J., Reinhard, M., Drewes, J. E. & Fox, P. (2003). Behavior of alkylphenol polyethoxylate metabolites during soil aquifer treatment. *Water Research* **37**, 3672-3681.
- Kimura, K., Amy, G., Drewes, J. E., & Watanabe, Y. (2003). Adsorption of hydrophobic compounds onto NF/RO membranes – an artifact leading to overestimation of rejection. *J. Membrane Science* **221**, 89-101.
- Kimura, K., Amy, G., Drewes, J. E., Heberer, T. & Watanabe, Y. (2003). Rejection of organic micropollutants (disinfection by-products, endocrine disrupting compounds, and pharmaceutically active compounds) by NF/RO membranes. *J. Membrane Science* **227**, 113-121.
- Mansell, J. and Drewes, J. E. (2004). Fate of steroidal hormones during soil-aquifer treatment (SAT). *J. Ground Water Monitoring and Remediation* **24**, 2, 94-101.
- Bellona, C., Drewes, J. E., Xu, P. & Amy, G. (2004). Factors affecting the rejection of organic solutes during NF/RO treatment – A literature review. *Water Research* **38**, 2795-2809.
- Mansell, J., Drewes, J. E., & Rauch, T., (2004). Removal mechanisms of endocrine disrupting compounds (steroids) during soil-aquifer treatment. *Water Science & Technology* **50**, 2, 229-237.
- Rauch, T. & Drewes, J.E. (2004). Assessing the removal potential of soil-aquifer treatment systems for bulk organic matter. *Water Science & Technology* **50**, 2, 245-253.
- Bellona, C. & Drewes, J. E. (2005). The role of physico-chemical properties of membranes and solutes for rejection of organic acids by nanofiltration membranes. *Journal of Membrane Science* **249**, 227-234.
- Xu, P., Drewes, J. E., Bellona, C., Amy, G., Kim, T., Adam, M. & Heberer, T. (2005). Rejection of emerging organic micropollutants in nanofiltration/reverse osmosis membrane applications. *Water Environment Research* **77**, 1, 40-48.
- Drewes, J. E., Hemming, J., Ladenburger, S., Schauer, J. & Sonzogni, W. (2005). An assessment of endocrine disrupting activity changes in water reclamation systems through the use of bioassays and chemical measurements. *Water Environment Research* **77**, 1, 12-23.
- Rauch, T. & Drewes, J. E. (2005). Quantifying biological organic carbon removal in groundwater recharge systems. *Journal of Environmental Engineering*, 909-923.
- Kim, T.-U., Amy, G. & Drewes, J. E. (2005). Rejection of trace organic compounds by high-pressure membranes. *Water Science & Technology* **51**, 6-7, 335-344.
- Drewes, J. E., Bellona, C., Oedekoven, M., Xu, P., Kim, T.-U., & Amy, G. (2005). Rejection of wastewater-derived micropollutants in high-pressure membrane applications leading to indirect potable reuse. *Environmental Progress* **24**, 4, 400-409.
- Amy, G., Kim, T. U., Yoon, J., Bellona, C. Drewes, J. E., Pellegrino, J. and Heberer, T. (2005). Removal Of Micropollutants By NF/RO Membranes. *Water Science and Technology: Water Supply*, **5** (5), 25-33
- Rauch-Williams, T. & Drewes, J. E. (2006). Using soil biomass as an indicator for the biological removal of effluent-derived organic carbon during soil infiltration. *Water Research* **40**, 961-968.
- Drewes, J. E., Quanrud, D., Amy, G. & Westerhoff, P. (2006). Character of Organic Matter in Soil-Aquifer Treatment Systems. *J. Environmental Engineering* **11**, 1447-1458.
- Xu, P., Drewes, J. E., Kim, T. Bellona, C. & Amy, G. (2006). Effect of membrane fouling on transport of emerging organic contaminants in NF/RO membrane applications. *J. Membrane Science* **279**, 165-175.
- Drewes, J. E., Hoppe, C., & Jennings, T. (2006). Fate and transport of N-nitrosamines under conditions simulating full-scale groundwater recharge operations. *Water Environment Research* **78**, 13, 2466-2473.
- Xu, P. & Drewes, J. E. (2006). Viability of nanofiltration and ultra low pressure reverse osmosis membranes for multi-beneficial use of methane produced water. *Separation and Purification Technology* **52**, 67-76.
- Sethi, S., Walker, S, Drewes, J. E., & Xu, P. (2006). Existing and emerging concentrate minimization and disposal practices for membrane systems. *Florida Water Resources Journal*, June, 38-48.

- Amy, G. and Drewes, J. E. (2007). Soil-aquifer treatment (SAT) as a natural and sustainable wastewater reclamation/reuse technology: Fate of wastewater effluent organic matter (EfOM) and trace organic compounds. *Environmental Monitoring and Assessment* **129**, 1-3, 19-26.
- Bellona, C. and Drewes, J. E. (2007). Viability of a low pressure nanofilter in treating recycled water for water reuse applications – A pilot-scale study. *Water Research* **41**, 3948-3958.
- Kim, T-U., Drewes, J.E., Summers, R.S., and Amy, G. (2007). Solute transport model for trace organic neutral and charged compounds through nanofiltration and reverse osmosis. *Water Research* **41**, 3977-3988.
- Sethi, S., Xu, P. and Drewes, J.E. (2007). When less is more. *Civil Engineering* **77**, 9, 72-75.
- Xu, P., Drewes, J.E. and Heil, D. (2008). Beneficial use of co-produced water through membrane treatment: Technical-economic assessment. *Desalination* **225**, 1-3, 139-155.
- Benko, K. and Drewes, J.E. (2008). Co-produced water in the Western United States: Geographical distribution, occurrence, and composition. *Environmental Engineering Science* **25**, 2, 239-246.
- Trenholm, B., Vanderford, B.J., Drewes, J.E., & Snyder, S.A. (2008). Determination of household chemicals using gas chromatography and liquid chromatography with tandem mass spectroscopy. *J. Chromatography A*. **1190**: 253-262.
- Bellona C., Oelker, G., Luna, J., Filteau, G., Amy, G. & Drewes, J.E. (2008). Comparing nanofiltration and reverse osmosis for drinking water augmentation. *J. American Water Works Association* **100**:9, 102-116.
- Xu, P., Drewes, J.E., Heil, D., and Wang, G. (2008). Treatment of brackish produced water using carbon aerogel-based capacitive deionization technology. *Water Research* **42**:10-11, 2605-2617.
- Lowe, K., Van Cuyk, S., Siegrist, R. & Drewes, J. E. (2008). Field Evaluation of the Performance of Engineered Onsite Wastewater Treatment Units. *J. Hydrologic Engineering*, **13**:8, 735-743.
- Simon, A., Nghiem, L.D., Le-Clech, P., Khan, S., McDonald, J. and Drewes, J.E. (2009). Effects of membrane degradation on the removal of pharmaceutically active compounds (PhACs) by NF/RO filtration processes. *J. Membrane Science* **340**: 16-25.
- Drewes, J.E. (2009). Ground Water Replenishment with Recycled Water—Water Quality Improvements during Managed Aquifer Recharge. *Ground Water* **47**:4, 502-505.
- Drewes, J.E., Hancock, N., Benko, K., Dahm, K., Xu, P., Heil, D., and Cath, T. (2009). Treatment of Coalbed Methane (CBM) Produced Water. *Exploration and Production: Oil and Gas Review*. **7**, 2, 126-128.
- Dickenson, E.R.V., Drewes, J.E., Sedlak, D.L., Wert, E., and Snyder, S.A. (2009). Applying Surrogates and Indicators to Assess Removal Efficiency of Trace Organic Chemicals during Chemical Oxidation of Wastewater. *Environmental Science and Technology* **43**, 6242-6247.
- Rauch-Williams, T., Hoppe-Jones, C., and Drewes, J.E. (2010). The Role of Organic Matter in the Removal of Emerging Trace Organic Contaminants during Managed Aquifer Recharge. *Water Research* **44**, 449-460.
- Xu, P., Bellona, C., and Drewes, J.E. (2010). Fouling of Nanofiltration and Reverse Osmosis Membranes during Municipal Wastewater Reclamation: Membrane Autopsy Results from Pilot-scale Investigations. *J. Membrane Science* **353**, 111-121.
- Conn, K., Lowe, K., Drewes, J.E., Hoppe-Jones, C., and Tucholke, M.B. (2010). Occurrence of Pharmaceuticals and Consumer Product Chemicals in Raw Wastewater and Septic Tank Effluent from Single-Family Houses. *Environmental Engineering Science* **27**:4, 347-356.
- Bellona, C., Marts, M., and Drewes, J.E. (2010). The Effect of Organic Membrane Fouling on the Properties and Rejection Characteristics of Two NF Membranes. *Separation and Purification Technology* **74**, 44-54.
- Dickenson, E.R.V. and Drewes, J.E. (2010). Quantitative structure property relationships for the adsorption of pharmaceuticals onto activated carbon. *Water Science and Technology* **62**:10, 2270-2276.
- Bellona, C.L., Würtele, A., Xu, P., and Drewes, J.E. (2010). Evaluation of a bench-scale membrane fouling protocol to determine fouling propensities of membranes during full-scale water reuse applications. *Water Science and Technology*. **62**:5, 1198-1204.
- Drewes, J.E., Khan, S.J., McDonald, J.A., Trang, T.T.T., and Storey, M.V. (2010). Chemical monitoring strategy for the assessment of advanced water treatment plant performance. *Water Science and Technology: Water Supply* **10**:6, 961-968.
- Hoppe-Jones, C., Oldham, G., and Drewes, J.E. (2010). Attenuation of Total Organic Carbon and Unregulated Trace Organic Chemicals in U.S. Riverbank Filtration Systems. *Water Research* **44**, 4643-4659.
- Le-Minh, N., Khan, S.J., Drewes, J.E., and Stuetz, R. (2010). Fate of antibiotics during municipal water recycling treatment processes. *Review. Water Research* **44**, 4295-4323.
- Cath, T.Y., Hancock, N.T., Lundin, C.D., Hoppe-Jones, C., Drewes, J.E. (2010). A Multi Barrier Hybrid Osmotic Dilution Process for Simultaneous Desalination and Purification of Impaired Water. *J. Membrane Science* **362**, 417-426.
- Dickenson, E., Drewes, J.E., Snyder, S.A., and Sedlak, D.L. (2011). Indicator Compounds: An Approach for Using Monitoring Data to Quantify the Occurrence and Fate of Wastewater-Derived Contaminants in Surface Waters. *Water Research* **45**, 1199-1212.
- Cath, T.Y., Drewes, J.E., Lundin, C.D., Hancock, N.T., Forward osmosis–reverse osmosis process offers a novel hybrid solution for water purification and reuse, *IDA Journal on Desalination and Water Reuse*, **Fourth Quarter 2010, January 2011**.
- Laws, B., Dickenson, E., Johnson, T., Snyder, S., Drewes, J.E. (2011). Attenuation of Contaminants of Emerging Concern during Surface Spreading Aquifer Recharge. *Sci. Total Environment* **409**, 1087-1094.
- Stevens-Garmon, J., Drewes, J.E., Khan, S., McDonald, J., Dickenson, E. (2011). Sorption of Emerging Trace Organic Compounds onto Wastewater Sludge Solids. *Water Research* **45**, 3417-3426.
- Dahm, K., Guerra, K., Xu, P., Drewes, J.E. (2011). A Composite Geochemical Database for Coalbed Methane Produced Water Quality in the Rocky Mountain Region. *Environmental Science and Technology* **45**, 7655-7663.
- Bellona, C., Budgell, K., Ball, D., Drewes, J., and Chellam, S. (2011). Models to predict organic contaminant removal by RO and NF Membranes. *IWA Journal*, **3**(2), 40-44.
- Missimer, T., Drewes, J.E., Maliva, R., Amy, G. (2011). Aquifer Recharge and Recovery: Groundwater Recharge Systems for Treatment, Storage, and Water Reclamation. *Ground Water* **49**(6), 771-772.
- Bellona, C., Heil, D., Yu, C., Fu, P., and Drewes, J. E. (2012). The pros and cons of using nanofiltration in lieu of reverse osmosis for indirect potable reuse applications. *Separation and Purification Technology* **85**, 69-76.
- Guerra, K., Pellegrino, J., Drewes, J.E. (2012). Impact of operating conditions on permeate flux and process economics for cross flow

- ceramic membrane ultrafiltration of surface water. *Separation and Purification Technology* 87(3), 47-53.
- Hyland, K.C., Dickenson, E., Drewes, J.E., and C.P. Higgins (2012) Sorption of Ionized and Neutral Emerging Trace Organic Compounds onto Activated Sludge from Different Wastewater Treatment Configurations. *Water Research* 46: 1958-1968.
- Fujioka, T., Nghiem, L., Khan, S., McDonald, J., Poussade, Y., Drewes, J.E. (2012). Effects of feed solution characteristics on the rejection of N-nitrosamines by reverse osmosis membranes. *J. Membrane Science* 409-410, 66-74.
- Teerlink, J., Hering, A., Higgins, C., Drewes, J.E. (2012). Variability of Trace Organic Chemical Concentrations in Raw Wastewater at Three Distinct Sewershed Scales. *Water Research* 46, 3261-3271.
- Missimer, T., Drewes, J.E., Amy, G., Maliva, R., Keller, S. (2012). Restoration of Wadi Aquifer by Artificial Recharge with Treated Waste Water. *Ground Water*, 50(4):514-27.
- Teerlink, J., Martinez-Hernandez, V., Higgins, C., Drewes, J.E. (2012). Removal of trace organic chemicals in onsite wastewater treatment units: A laboratory experiment. *Water Research* 46(16): 5174-5184.
- Li, D, Sharp, J.O., Saikaly, P.E., Ali, S., Alidina, M., Alarawi, M., Keller, S., Hoppe-Jones, C., Drewes, J.E. (2012). Dissolved Organic Carbon Influences Microbial Community Composition and Diversity in Geographically Distinct Managed Aquifer Recharge Systems. *Applied and Environmental Microbiology* 78(19): 6819-6828.
- Drewes, J.E., Rao Garduno, C.P., Amy, G.L. (2012). Water reuse in the Kingdom of Saudi Arabia – status, prospects and research needs. *Water Science and Technology: Water Supply*. 12(6): 926-936.
- Hoppe-Jones, C., Dickenson, E., Drewes, J.E. (2012). Role of Microbial Adaptation and Bioavailable Substrate on the Attenuation of Trace Organic Chemicals during Groundwater Recharge. *Science of the Total Environment* 437: 137-144.
- Fujioka, T., Khan, S.J., Poussade, Y., Drewes, J.E., Nghiem, L.D. (2012). N-nitrosamine removal by reverse osmosis for indirect potable water reuse - A critical review based on observations from laboratory, pilot and full scale studies. *Separation and Purification Technology* 98. 503-515.
- Linden, K., McClelland, C.J., Drewes, J.E., Khan, S., Raucher, R. (2012). Water Reuse 2030 - Identifying Future Challenges and Opportunities. *Water Reuse and Desalination* 3(3), 23-27.
- Drewes, J.E., Khan, S., Mujeriogo, R. (2012). Water reuse: achievements and future challenges. *J. Water Supply: Research and Technology-AQUA* 61(8), 461-462.
- McClelland, C.J., Linden, K., Drewes, J.E., Khan, S., Raucher, R., Smith, J. (2012). Determining Key Factors and Challenges that Affect the Future of Water Reuse. *J. Water Supply: Research and Technology – AQUA* 61(8), 518-528.
- Drewes, J.E., Anderson, P., Denslow, N., Olivieri, A., Schlenk, D., Snyder, S.A., Maruya, K.A. (2013). Designing Monitoring Programs for Chemicals of Emerging Concern in Potable Reuse - What to include and what not to include? *Water Science and Technology* 67(2). 433-439.
- Fujioka, T., Nghiem, L.D., Khan, S., McDonald, J., Henderson, R., Poussade, Y., Drewes, J.E. (2013). Effects of membrane fouling on N-nitrosamine rejection by nanofiltration and reverse osmosis membranes. *J. Membrane Science* 427, 311-319.
- Fujioka, T., Khan, S., McDonald, J., Roux, A., Poussade, Y., Drewes, J.E., Nghiem, L. (2013). N-nitrosamine rejection by nanofiltration and reverse osmosis membranes: the importance of membrane characteristics. *Desalination* (in press).
- Li, D., Alidina, M., Ouf, M., Sharp, J.O., Saikaly, P., Drewes, J.E. (2013). Microbial community evolution during simulated managed aquifer recharge in response to different biodegradable dissolved organic carbon (BDOC) concentrations. *Water Research* 47, 2421-2430.
- Vuono, D., Henkel, J., Benecke, J., Cath, T., Reid, T., Johnson, L., Drewes, J.E. (2013). Towards sustainable distributed water reuse within urban centers using flexible hybrid treatment systems for tailored nutrient management. *J. Membrane Science* 446, 34-41.
- Sedlak, D.L., Drewes, J.E., Luthy, R. (2013). Introduction: Reinventing Urban Water Infrastructure. *Environmental Engineering Science* 30(8), 393-394.
- Hering, J.G., Waite, T.D., Luthy, R.G., Drewes, J.E., Sedlak, D.L. (2013). A changing framework for urban water systems. *Environmental Science and Technology* (in press) DOI: 10.1021/es4007096.
- Regnery, J., Lee, J., Kitanidis, P., Illangasekare, T., Sharp, J.O., Drewes, J.E. (2013). Integration of Managed Aquifer Recharge for Impaired Water Sources in Urban Settings – Overcoming Current Limitations and Engineering Challenges. *Environmental Engineering Science* 30(8), 409-420.
- Xu, P., Tzahi Cath, T.Y., Robertson, A.P., Reinhard, M., Leckie, J.O., Drewes, J.E. (2013). Critical review of desalination concentrate management, treatment and beneficial use. *Environmental Engineering Science* 30(8), 502-514.
- Tu, K., Fujioka, T., Khan, S.J., Poussade, Y., Roux, A., Drewes, J.E., Chivas, A., Nghiem, L. (2013). Boron as a surrogate for N-nitrosodimethylamine (NDMA) rejection by reverse osmosis membranes in potable water reuse applications. *Environmental Science and Technology* 47(12), 6425-6430.
- Fujioka, T., Oshima, N., Suzuki, R., Khan, S.J., Roux, A., Poussade, Y., Drewes, J.E., Nghiem, L.D. (2013). Rejection of small and uncharged chemicals of emerging concern by reverse osmosis membranes: the role of free volume space within the active skin layer. *Separation and Purification Technology* 116, 426-432.
- Yoon, M.K., Drewes, J.E., Amy, G.L. (2013). Fate of Bulk and Trace Organics during a Simulated Aquifer Recharge and Recovery (ARR)-Ozone Hybrid Process. *Chemosphere* 93(9), 2055-2062.
- Fujioka, T., Khan, S., McDonald, J., Roux, A., Poussade, Y., Drewes, J.E., Nghiem, L. (2013). N-nitrosamine rejection by reverse osmosis membranes: a full scale study. *Water Research* 47(16), 6141-6148.
- Maruya, K.A., Schlenk, S., Anderson, P.D., Denslow, N.D., Drewes, J.E., Olivieri, A.W., Scott, G.I., and Snyder, S.A. (2013). An Adaptive, Comprehensive Monitoring Strategy for Chemicals of Emerging Concern (CECs) in California's Aquatic Ecosystems. *Integrated Environmental Assessment and Management* (in press).
- Sengupta, A., Lyons, M., Smith, D., Drewes, J.E., Snyder, S., Heil, A., Maruya, K. (2013). The occurrence and fate of chemicals of emerging concern (CECs) in coastal urban rivers receiving discharge of treated municipal wastewater effluent. *Environmental Toxicology and Chemistry* DOI: 10.1002/etc.2457.
- Fujioka, T., Khan, S.J., MacDonald, J., Roux, A., Poussade, Y., Drewes, J.E., Nghiem, L.D. (in press). N-nitrosamine rejection by reverse osmosis: Effects of membrane exposure to chemical cleaning agents. *Desalination*.
- Vanderford, B., Drewes, J.E., Eaton, A., Guo, Y., Haghani, A., Hoppe-Jones, C., Schluessner, M., Snyder, S.A., Ternes, T., Wood, C. (in

press). Results of an interlaboratory comparison of analytical methods for contaminants of emerging concern in water. *Analytical Chemistry*.

Fujioka, T., Khan, S.J., McDonald, J.A., Roux, A., Poussade, Y., Drewes, J.E., Nghiem, L.D. (in press). Modeling the rejection of N-nitrosamines by a Spiral-Wound Reverse Osmosis System: Mathematical model development and validation. *J. Membrane Science*.

Peer-Reviewed Books and Book Contributions

- Drewes, J. E. & Jekel, M. (1996). Reuse of Advanced Treated Sewage Effluent for Groundwater Recharge. Nordic Hydrological Programme. Report No. 38. 161-167.
- Drewes, J. E., Bornhardt, C. & Jekel, M. (1996). Untersuchungen zur Nutzung von Klarwässern für eine Versickerung auf Rieselfeldböden. Schriftenreihe im Fachbereich Umwelt und Gesellschaft. Landschaftsentwicklung und Umweltforschung, Technische Universität Berlin, Berlin. Nr. 101. 93-100.
- Drewes, J. E. (1996). Wende zu einer nachhaltigen Wassernutzung. K.H. Hübler, U. Weiland (Eds.). Nachhaltige Entwicklung. Eine Herausforderung für die Forschung? Verlag für Wissenschaft und Forschung. Berlin. 153-166.
- Drewes, J. E. (1997). Behavior of organic compounds in domestic effluents used for groundwater recharge. Fortschritt-Berichte VDI-Verlag No 174, Umwelttechnik, Düsseldorf (in German).
- Drewes, J. E., Fox, P. & Ziegler, D. (1998). Impact of drinking water sources on refractory DOC in water reuse systems. Peters et al. (eds.), *Artificial Recharge of Groundwater*. Balkema, Rotterdam, 461-463.
- Drewes, J. E. (1998). Anforderungen an eine nachhaltige Wassernutzung in Berlin-Brandenburg. Forschungs- und Sitzungsberichte. Nachhaltige Raumentwicklung. Szenarien und Perspektiven für Berlin-Brandenburg. Band 205. Akademie fuer Raumforschung und Landesplanung. Hannover. 199-217.
- Drewes, J. E., Fox, P. & Nellor, M. (2000). Efficiency and Sustainability of Soil-Aquifer Treatment for Indirect Potable Reuse of Reclaimed Water. I. Chorus et al. (eds.), *Water, Sanitation & Health*. IWA Publishing, London, 227-232. (ISI: 1)
- Drewes, J. E. & Shore, L. S. (2001). Concerns about pharmaceuticals in water reuse, groundwater recharge, and animal waste. In: Ch. Daughton and T. L. Jones-Lepp (Eds.) *American Chemical Society Symposium Series 791 "Pharmaceuticals and personal care products in the environment"* No. 791, Washington, D.C., 206-228. (ISI: 5)
- Drewes, J. E. & Summers, S. R. (2002). Removal of NOM during bank filtration: Current knowledge and research needs. In: C. Ray, Melin, G. and Linsky, R. (eds.), *Riverbank filtration: Improving source water quality*. Kluwer Academic Publishers, Dordrecht, The Netherlands. 303-310.
- Drewes, J. E. (2004). Fate and transport of organic constituents during ground water recharge using water of impaired quality. Risk Assessment of Waste Water Re-use on Groundwater Quality. J. Steenvoorden and T. Endrey (eds.). *Wastewater Re-use and Groundwater Quality*. International Association of Hydrological Sciences (IAHS) Publ. 285. 85-91. Oxfordshire, UK.
- Drewes, J. E. (2005). Wastewater Reclamation and Reuse Research. In: *Water Encyclopedia*. J. Lehr and J. Keeley (eds.). Volume 5. Wiley.
- Xu, P., Drewes, J. E., Oedekoven, M., Bellona, C., Amy, G. (2006). Rejection of non-ionic organic micropollutants by nanofiltration membranes: Effect of membrane fouling. *AWWA Best Membrane Papers Book*. Kerry Howe (ed.). American Water Works Association (AWWA), Denver, Colorado.
- Rivett, M., Drewes, J.E., Barrett, M., Chilton, J., Appleyard, S., Dieter, h.H., Wauchope, D., & Fastner, J. (2006). Chemicals: Health Relevance, Transport and Attenuation. In: WHO Ground Water Monograph. O. Schmoll, G. Howard, J. Cliton, and I. Chorus (eds.). World Health Organization (WHO), Geneva. IWA Publishing, London. 81-131.
- Drewes, J.E. (2007). Removal of pharmaceuticals in wastewater and drinking water treatment. In: Analysis, fate and removal of pharmaceuticals in the water cycle. M. Petrovic and D. Barcelo (eds.). *Comprehensive Analytical Chemistry*. Vol. 50. Wilson & Wilsons. Elsevier, Amsterdam. 427-446. (ISI: 2)
- Ray, C., Grischek, T., Hubbs, S., Drewes, J.E., Haas, D. and Darnault, C. (2008). Riverbank Filtration for Drinking Water Supply. ASCE Riverbank Filtration. American Society of Civil Engineers. Riverbank Filtration Task Force. John Wiley & Sons.
- Drewes, J. E., Gower, A., Mitchell, R. & Zabel, T. (2010). Chemicals: Health Relevance, Transport and Attenuation. In: WHO Surface Water Monograph. World Health Organization (WHO), Geneva.
- Xu, P., Cath, T., Wang, G., Drewes, J.E. and Ruetten, J. (2010). Consider the Pros and Cons of Desalination. In *Sustainability of Water Resources and Supplies*. Editor Frederick Bloetscher. *Publisher American Water Works Association (AWWA)*.
- Drewes, J.E. and Khan, S. (2010). Water Reuse for Drinking Water Augmentation. J. Edzwald (ed.) *Water Quality and Treatment*, 6th Edition. 16.1-16.48. American Water Works Association. Denver, Colorado.
- Bellona, C. and Drewes, J.E. (2010). Comparing the Phenomenological and Hydrodynamic Modeling Approaches for Describing the Rejection of Emerging Nonionic Organic Contaminants by a Nanofiltration Membrane. *ACS Symposium Series*, vol. 1048. *Pharmaceuticals and Personal Care Products and Organohalogenes*. Chapter 20, pp 397-420. DOI: 10.1021/bk-2010-1048.ch020, Washington, D.C.
- Drewes, J., Bull, R., Crook, J., Debroux, J., Fox, P., Snyder, S. and Williams, D. (2012). BDOC as a performance measure for organics removal in groundwater recharge of recycled water. NWRI-2012-05. NWRI, Fountain Valley, CA.
- Trinh, T., van den Akker, B., Le-Clech, P., Branch, A., Drewes, J.E., Khan, S. (in press). Impacts of hazardous events on performance of membrane bioreactors. F.I. Hai, K., Yamamoto, C. Lee (eds.). *Membrane Biological Reactors: Theory, Modelling, Design, Management and Applications to Wastewater Reuse*. IWA Publishing, London.
- Prieto, A.L., Vuono, D., Holloway, R., Benecke, J., Henkel, J., Cath, T.Y., Reid, T., Johnson, L., Drewes, J.E. (2013). Decentralized Wastewater Treatment for Distributed Water Reclamation and Reuse: The Good, The Bad and The Ugly – Experience from a Case Study. Book Series "*Novel Solutions to Water Pollution*", Vol. 1123. Chapter 15, pp 251-266. American Chemical Society.
- Xu, P., Elson, B., Drewes, J.E. (in review). Electrosorption of Heavy Metals with Capacitive Deionization: Water Reuse, Desalination and Resources Recovery. *Desalination: Water for Water*. Scrivener Publisher LLC.
- Cath, T., Geza, M., Drewes, J.E., Xu, P. (2013). Decision support tool for management of produced and frac-flowback water.

Wolkersdorfer, Brown & Figueroa (eds). Reliable Mine Water Technology. IMWA 2013. 1199-1204.

Trinh, T., van den Akker, B., Le-Clech, P., Branch, A., Drewes, J.E., Khan, S. (2014). Impacts of hazardous events on performance of membrane bioreactors. F.I. Hai, K., Yamamoto, C. Lee (eds.). Chapter 7. Membrane Biological Reactors: Theory, Modelling, Design, Management and Applications to Wastewater Reuse. IWA Publishing, London. 207-221.