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EDUCATION

2012/08 – 2017/12	Ph.D.	School of Marine and Atmospheric Sciences (SoMAS), Stony Brook Univ., NY, USA
2006/09 – 2008/07	M.S.	Institute of Oceanography, National Taiwan Univ., Taiwan
2002/09 – 2006/05	B.S.	Depart. of Earth Sciences, National Taiwan Normal Univ., Taiwan

EMPLOYMENT

2022/08 – present	Assistant Research Fellow	RCEC, Academia Sinica, Taiwan
2020/06 – 2022/06	Research Scientist	NYS Center for Clean Water Technology, NY, USA
2018/05 – 2020/05	Senior Research Specialist	NYS Center for Clean Water Technology, NY, USA
2018/01 – 2018/04	Postdoctoral Researcher	SoMAS, Stony Brook Univ., NY, USA

HONORS & AWARDS

2018	The Brinkhuis Award for the Best Dissertation, SoMAS, Stony Brook University
2012 – 2015	Taiwan MOE sponsorship for overseas study (教育部公費留考)
2008	Dean's award for outstanding student thesis, National Taiwan University

PROFESSIONAL SERVICE

Reviewer for Peer-review Journals

Nature Communication, PNAS, Environmental Science & Technology, Limnology and Oceanography, Marine Chemistry, Science of the Total Environment, Water Research, Chemosphere, Deep-sea Research, Environmental Toxicology & Chemistry, Harmful Algae, PloS One, One Earth (Cell Press), Journal of Plankton Research, Ecotoxicology, Environmental Science and Pollution Research, Journal of Fish Biology, Marine Pollution Bulletin, Journal of Hazardous Materials

RESEARCH INTEREST

My research focuses on various chemical contaminants (e.g., methylmercury, 1,4-dioxane, and per- and polyfluoroalkyl substances) in freshwater and marine environments. I am interested in studying their (i) occurrence, transformation, and biogeochemical processes, (ii) interaction with aquatic organisms (e.g., from phytoplankton to apex predators), (iii) bioaccumulation/transfer in the

aquatic food chain, and ultimately (iv) their fate in the water cycle in response to environmental changes.

I am also dedicated to developing (i) robust sample preparation/analytical methods for detecting/quantifying emerging contaminants that exist in complex sample matrices and (ii) novel treatment methods for removing persistent emerging contaminants in waters, evaluating how water quality parameters influence treatment performance, and investigating any possible formation of adverse byproducts.

RESEARCH HIGHLIGHTS

1. **Methylmercury bioaccumulation in marine phytoplankton**
   Methylmercury (MeHg) has long been recognized as an important contaminant in marine ecosystems. The largest bioconcentration step of MeHg in marine food webs is from the aqueous phase to phytoplankton. The first systematic comparison of MeHg bioaccumulation among six different algal species was conducted in this study, examining the influence of environmental factors on the uptake process and discussing subsequent biogeochemical implications. The result shows that passive transport seemed to be the primary pathway for most phytoplankton to acquire MeHg and was related to the surface-area-to-volume ratio of algal cells. Environmental conditions did not directly affect MeHg uptake except for the mixotrophic dinoflagellate which showed active uptake of MeHg. The presence of dissolved organic matter, especially those with a sulfur functional group (thiol), was confirmed to inhibit algal MeHg uptake. The algal MeHg uptake rates and bioconcentration factors in diverse algal species were calculated in this study and further applied to a global biogeochemical model describing Hg cycling in the marine environment.

2. **Methylmercury accumulation in large pelagic fish, Atlantic bluefin tuna (ABFT)**
   Seafood consumption is the greatest source of neurotoxic MeHg for human exposure and relatively high mercury (Hg) concentrations (mostly MeHg) in the large, long-lived tunas have been indicated as a potential health concern for frequent consumers. Very few data are available for Hg concentrations in western ABFT, and prior studies were often based on small sample sizes that cannot represent populations or resolve temporal trends. Dr. Lee presented striking new information on changing Hg concentrations in ABFT. This dataset of Hg in tuna (n ≈1300), the largest of its kind, is the first to demonstrate a significant change in Hg in tuna in response to emission reduction efforts. The study indicates that there has been a significant temporal decline of Hg concentrations in these fish in recent decades (~2% per year), identical to the declines in Hg emissions from North American power plants, Hg concentrations in North Atlantic air, and in Atlantic seawater during this period. The rapid response of the tuna to the changes in the Hg loadings is striking, and it is the first evidence showing that efforts made to reduce Hg emissions have a pronounced and immediate beneficial effect on the quality of seafood. Demonstrating this

trend in ABFT is particularly compelling due to their extraordinary market value and position as an iconic high trophic level marine fish with high Hg levels, large size, and long lifespans.

3. **Treatment of emerging contaminant 1,4-dioxane in groundwater in Long Island, New York, using advanced oxidation processes**
   1,4-Dioxane (1,4-D) is a likely human carcinogen and a widespread drinking water contaminant across the U.S. Due to the lack of federal regulations, several states are adopting drinking water standards and upgrading their water treatment facilities to eliminate 1,4-D contamination. Conventional water treatment approaches do not effectively remove 1,4-D, and hence, advanced oxidation processes (AOPs) are increasingly being employed by water suppliers. A series of systematic studies to assess the impact of groundwater quality on treating environmentally relevant levels of 1,4-D was performed in this study. Typical groundwater quality parameters (pH, alkalinity, natural organic matter (NOM), nitrate, and Fe) on the performance of UV/H2O2 treatment and the formation of associated byproducts were investigated simultaneously. With the lab-scale controlled experiments, a multiple linear regression model using water quality data was developed to predict the performance of UV/H2O2 treatment of actual groundwater. The model output agreed with field observations in predicting the rate constants for removing 1,4-D from field groundwater samples. The results of this study should assist with the design and evaluation of pilot- and full-scale UV/H2O2 treatment systems and should be of interest to a broad audience of environmental scientists, various regulatory agencies, and public health professionals.

REPRESENTATIVE PUBLICATIONS (*: corresponding author)

1. **Lee, C. -S.**, K. Londhe, C. Cooper, S. Grdanovska, & A. K. Venkatesan*. (2023) Emerging investigator series: Low doses of electron beam irradiation effectively degrade 1, 4-dioxane in water within a few seconds. *Environmental Science: Water Research & Technology*.
2. **Lee, C. -S.**, M. Wang, P. M. Clyde, X. Mao, B. J. Brownawell, A. K. Venkatesan*. (2023) 1, 4-Dioxane removal in nitrifying sand filters treating domestic wastewater: Influence of water matrix and microbial inhibitors. *Chemosphere*, 138304.
3. Li, D., **C. -S. Lee**, Y. Zhang, R. Das, F. Akter, A. K. Venkatesan* & B. S. Hsiao*. (2023) Efficient removal of short-chain and long-chain PFAS by cationic nanocellulose. *Journal of Materials Chemistry A*.
4. Huang, X., **C. -S. Lee**, K. Zhang, A. G. Alhamzani, & B. S. Hsiao*. (2023) Sodium Alginate–Aldehyde Cellulose Nanocrystal Composite Hydrogel for Doxycycline and Other Tetracycline Removal. *Nanomaterials*, 13(7), 1161.
5. Tang, Y., M. Wang, **C. -S. Lee**, A. K. Venkatesan, X. Mao*. (2023) Characterization of 1, 4-dioxane degrading microbial community enriched from uncontaminated soil. *Applied Microbiology and Biotechnology*, 107, 955-969.
6. Doherty, A. C., **C. -S. Lee,** Q. Meng, Y. Sakano, A. E. Noble, K. A. Grant, ... & A. K. Venkatesan*. (2022) Contribution of household and personal care products to 1, 4-dioxane

contamination of drinking water. *Current Opinion in Environmental Science & Health*, 100414.

7. Londhe, K., **C. -S. Lee,** C. A. McDonough, & A. K. Venkatesan*. (2022) The Need for Testing Isomer Profiles of Perfluoroalkyl Substances to Evaluate Treatment Processes. *Environmental Science & Technology,* 56(22), 15207-15219.
8. Young, C. S., **C. -S. Lee**, L. H. Sylvers, A. K. Venkatesan, & C. J. Gobler*. (2022) The invasive red seaweed, Dasysiphonia japonica, forms harmful algal blooms: Mortality in early life stage fish and bivalves and identification of putative toxins. *Harmful Algae*, 118, 102294.
9. Venkatesan, A. K.*, **C. -S. Lee**, and C. J. Gobler. (2022) Hydroxyl-radical based advanced oxidation processes can increase perfluoroalkyl substances beyond drinking water standards: Results from a pilot study. *Science of The Total Environment*, 157577
10. Ye, X., **C. -S. Lee**, O. N. Shipley, M. G. Frisk, and N. S. Fisher* (2021) Risk assessment for seafood consumers exposed to mercury and other trace elements in fish from Long Island, New York, USA. *Marine Pollution Bulletin,* 176: 113442.
11. Tang, Y., **C. -S. Lee**, H. Walker, C. J. Gobler, O. Apul, A. K. Venkatesan, and X. Mao*. (2021) Effect of residual H_2O_2 on the removal of advanced oxidation byproducts by two types of granular activated carbon. *Journal of Environmental Chemical Engineering,* 9(6): 106838.
12. Li, D., K. Londhe, K. Chi, **C. -S. Lee**, A. K. Venkatesan*, and B. S. Hsiao*. (2021) Functionalized bio-adsorbents for removal of perfluoroalkyl substances: A perspective. *AWWA Water Science,* 3(6): e1258.
13. Clyde, P. M., **C. -S. Lee**, R. E. Price, A. K. Venkatesan*, and B. J. Brownawell*. (2021) Occurrence and removal of PPCPs from on-site wastewater using nitrogen removing biofilters. *Water Research,* 206: 117743
14. Londe, K., **C. -S. Lee**, Y. Zhang, S. Grdanovska, T. Kroc, C. A. Cooper, A. K. Venkatesan*. (2021) Energy evaluation of electron beam treatment of perfluoroalkyl substances in water: a critical review. *Environmental Science and Technology: Engineering,* 1(5), 827-841
15. **Lee, C. -S.,** C. Asato, M. Wang, X. Mao, C. J. Gobler, A. K. Venkatesan*. (2021) Removal of 1,4-dioxane during on-site wastewater treatment using nitrogen removing biofilters. *Science of the Total Environment,* 771, 144806
16. Shipley, O. N.*, **C. -S. Lee**, N. S. Fisher, J. K. Sternlicht, S. Kattan, E. Staaterman, N. Hammerschlag, A. J. Gallagher. (2021) Patterns of metal concentrations in coastal shark species from The Bahamas with a focus on a common reef predator, the Caribbean reef shark. *Scientific Report,* 11(1), 1-11
17. Ye, X, K. Rountos, **C. -S. Lee**, N. S. Fisher*. (2021) Effects of methylmercury on the early life stages of an estuarine forage fish using two different dietary sources. *Marine Environmental Research,* 164, 105240
18. **Lee, C. -S.**, A. K. Venkatesan*, H. W. Walker, C. J. Gobler. (2020) Impact of groundwater quality and associated byproduct formation during UV/hydrogen peroxide treatment of 1,4-dioxane. *Water Research,* 173(15), 115534

19. **Lee, C. -S**.*, and N. S. Fisher. (2019) Microbial generation of elemental mercury from dissolved methylmercury in seawater. *Limnology and oceanography,* 64(2), 679-693
20. Shipley, O. N.*, **C. -S. Lee**, N. S. Fisher, G. Burruss, M. G. Frisk, E. J. Brooks, Z. C. Zuckerman, A. D. Herrmann, D. J. Madigan. (2019) Trophodynamics and mercury bioaccumulation in reef and open-ocean fishes from The Bahamas with a focus on two teleost predators. *Marine Ecology Progress Series* 608: 221-232
21. Thomas, D. M., **C. -S. Lee**, and N. S. Fisher*. (2018) Bioaccumulation and trophic transfer of ^{137}Cs in marine and freshwater plankton. *Chemosphere* 209: 599-607
22. **Lee, C. -S**.*, and N. S. Fisher. (2017) Bioaccumulation of methylmercury in a marine diatom and the influence of dissolved organic matter. *Marine Chemistry* 197: 70-79
23. **Lee, C. -S**.*, and N. S. Fisher. (2017) Bioaccumulation of methylmercury in a marine copepod. *Environmental Toxicology and Chemistry* 36(5): 1287-1293
24. **Lee, C. -S.***, M. E. Lutcavage, E. Chandler, D. J. Madigan, R. M. Cerrato, and N. S. Fisher. (2016) Declining mercury concentrations in bluefin tuna reflect reduced emissions to the North Atlantic Ocean. *Environmental Science and Technology* 50: 12825-12830
25. **Lee, C. -S.*** and N. S. Fisher. (2016) Methylmercury uptake by diverse marine phytoplankton. *Limnology and Oceanography* 61: 1626-1639
26. **Lee, C. -S**., C. -L. Wei, L. -S. Wen, D. D. D. Sheu, and W. -H. Lee. (2013) Distribution and removal of silver and lead in the nearshore waters of western Taiwan. *Estuaries and Coasts* 36: 854-865

Invited talks/Conference presentations

1. **Lee, C. -S.**, O.N. Shipley, X. Ye, A.J. Gallagher, M.G. Frisk, B.S. Talwar, E.V. Schneider, A.K. Venkatesan. "Accumulation of per- and polyfluoroalkyl substances (PFAS) by sharks from two contrasting habitats: New York Bight and The Bahamas". Goldschmidt 2023 Conference, Lyon, France, Jul 9-14, 2023
2. **Lee, C. -S.** "Per- and Polyfluoroalkyl Substances (PFAS) Testing Facility at the NYS Center for Clean Water Technology: Challenges in Detection and Water Treatment" NYS Center for Clean Water Technology Monthly Seminar Series. Dec 7, 2020 (virtual seminar)
3. **Lee, C. -S.** "Methylmercury bioaccumulation, transformation, and trophic transfer in marine food chains" Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan. Oct 21, 2020 (virtual seminar)
4. Venkatesan, A.K. and **Lee, C. -S.** "Poly- and Perfluoroalkyl Substances in Water: Challenges and Mitigating Strategies in Detection and Treatment" On-demand webcast hosted by LC-GC and Agilent Technologies. Mar 5, 2020
5. **Lee, C. -S.** "Methylmercury bioaccumulation, transformation, and trophic transfer in marine food chains" Department of Oceanography, National Sun Yat-sen University, Kaohsiung, Taiwan. Dec

16, 2019

6. **Lee, C. -S.** "Impact of groundwater quality parameters on 1,4-dioxane removal and associated byproducts formation during UV/hydrogen peroxide advanced oxidation process treatment" Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan. Dec 11, 2019
7. **Lee, C. -S.** "Impact of groundwater quality parameters on 1,4-dioxane removal and associated byproducts formation during UV/hydrogen peroxide advanced oxidation process treatment" Department of Civil Engineering, Stony Brook University, Stony Brook, NY. Oct 21, 2019
8. **Lee, C. -S.**, A. K. Venkatesan, H. W. Walker, C. J. Gobler. Impact of groundwater quality parameters on 1,4-dioxane removal and associated byproducts formation during UV/hydrogen peroxide advanced oxidation process treatment. (2019) ACS Fall 2019 National Meeting & Exposition, San Diego, CA (oral)
9. **Lee, C. -S.**, and N. S. Fisher. Microbial generation of elemental mercury from dissolved methylmercury in seawater. (2018) SETAC North America 39th Annual Meeting, Sacramento, CA (oral)
10. Crawford, L., G. Paterson, N. Dheilly, **C. -S. Lee**, N. S. Fisher, J. Olin, A. McElroy. Contaminant body burdens and molecular responses associated with dietary exposure to mercury and POPs in the little skate (Leucoraja erinacea). (2018) SETAC North America 39th Annual Meeting, Sacramento, CA (poster)
11. **Lee, C. -S.**, and N. S. Fisher. Elemental mercury production in seawater by coastal bacterial assemblages. (2017) Goldschmidt conference, Paris, France (oral).
12. **Lee, C. -S.**, and N. S. Fisher. Elemental mercury production in seawater by coastal bacterial assemblages. (2017) 13th International Conference on Mercury as a Global Pollutant, Providence, RI (oral).
13. **Lee, C. -S.**, and N. S. Fisher. Declining mercury concentrations in bluefin tuna. (2017) SUNY Graduate Research Conference, Saratoga Springs, NY (poster).
14. **Lee, C. -S.**, and N. S. Fisher. Methylmercury bioaccumulation, transformation, and trophic transfer in marine plankton assemblages. (2016) Ocean Sciences Meeting, New Orleans, LA (poster).
15. **Lee, C. -S.**, and N. S. Fisher. Methyl mercury uptake by diverse marine phytoplankton and trophic transfer to zooplankton. (2014) AGU Fall Meeting, San Francisco, CA (oral).
16. **Lee, C. -S**., C. -K. Wang, L. -S. Wen. Distribution and perturbation of dissolved silver in western Pacific marginal seas: from head waters to the open ocean. (2012) Ocean Sciences Meeting, Salt Lake City, UT (poster).
17. Wen, L. -S, **C. -S. Lee**, Y. -C. Fong. Dynamics of dissolved, colloidal, and particulate phosphorous: A case study in DanShuei tributary-Estuary, northern Taiwan. (2011) AGU Fall Meeting, San Francisco CA (poster).
18. Wen, L. -S, C. -K. Wang, **C. -S. Lee**, C. -L. Wei, K. -T. Jiann, Determination of spatial variations of dissolved Ag in Pacific marginal seas by clean method. (2010) Ocean Science Meeting,

Portland, OR (poster).