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EDUCATION

2009/09 – 2013/12 Ph.D. Depart. of Oceanography, Texas A&M University, USA

2001/09 – 2003/08 M.S. Institute of Oceanography, National Taiwan University, Taiwan

1996/09 – 2000/08 B.A. Depart. of Marine Resources, National Sun Yat-sen Uni., Taiwan

EMPLOYMENT

2016/08 - present Assistant Research Fellow, RCEC, Academia Sinica, Taiwan

2015/05 - 2016/07 Postdoctoral Fellow, Depart. of Land, Air and Water Resources, University of California, Davis, USA

2014/01 - 2015/04 Postdoctoral Fellow, Depart. of Oceanography, Texas A&M University, USA

HONORS & AWARDS

2015 JAMESTEC International Postdoctoral Fellowship Award, Japan

2014 Erma Lee and Luke Mooney Graduate Student Research Excellence Award, Texas A&M University at Galveston, USA

2009-2013 Sharp Fellowship/Scholarship, Depart. of Oceanography, Texas A&M University, USA

RESEARCH INTERESTS

⊗ Marine organic biogeochemistry

⊗ Chemical Oceanography/Marine radiochemistry

RESEARCH HIGHLIGHTS

1. Constraining biomarkers to trace sources, sinks, reactivity, and budgets of dissolved organic matter in aquatic systems

Major vegetation around the world is on the move as global climatic patterns shift, altering terrestrial sources of dissolved organic matter (DOM) entering water from rivers to the ocean. Changes in the sources of DOM will affect its bioavailability to native aquatic microbial communities. In Harfmann et al. (2019), despite unique initial optical dissolved organic matter signatures, vascular plant leachates lose their distinctive chemical characteristics (as indicated by

optical proxies and biomarkers trends) upon microbial and combined microbial-photochemical degradation. In freshwater or estuarine systems, observed DOM compositional convergence may act as a natural buffer to provide stability of aquatic DOM cycling in the face of future landscape changes in vegetation inputs.

2. **Role of organic biopolymers in the fractionation and scavenging of radionuclides in aquatic systems**

Natural radionuclides, e.g., thorium and protactinium isotopes, have long been used as tracers of oceanic processes, e.g., boundary scavenging, ocean circulation, and paleo-productivity.

Nonetheless, different radionuclides ratios in suspended or sinking particles can vary as a function of chemical composition, location, depth, size, and etc. Many field studies have been shown that the bulk organic content in the particles is not a good predictor for the scavenging, even though most likely, sorption to organic biopolymers has the potential to control the extent of radionuclide scavenging. This is likely due to the fact that these biopolymers are minor components in the particle flux, and co-produced with biomineral phase in the organisms, e.g., biogenic silica and CaCO₃ shells, thus hiding their role when one only determines major components in particle assemblage. Shown from our field data in Chuang et al. (2013, 2015a), hydroxamate siderophoric moieties are major classes of biopolymers that have a role in binding Th, Pa and Po radionuclides in the sinking particles as well as in the colloidal organic matters; CaCO₃ and opal (Si) are important in predicting removal and fractionation of Th and Be in the ocean. Consistently, our laboratory data strongly support that organic biopolymers in diatom frustules of *Phaeodactylum tricomutum* greatly enhance *K_d* values of ⁷Be, ²³⁴Th, ²³³Pa and ²¹⁰Po (Chuang et al., 2014, 2015b).

REPRESENTATIVE PUBLICATIONS

Peer-reviewed papers (*: corresponding author)

1. **Chuang, C.-Y. A.*** & Ho, Y.-H. (2023). The influence of sources and solid phase extraction criteria on dissolved organic matter optical properties in aquatic systems. *Frontiers in Marine Science*, 10.
2. Yu, Q., **Chuang, C.-Y. A.***, Jiang, Y.*, Zhong, H., Cundy, A., Kwong, R. W. M., Min, C., Zhu, X., Ji, R. (2023). Exploring Environmental Nanoplastics Research: Networks and Evolutionary Trends. *Reviews of Environmental Contamination and Toxicology*, 261(12).

3. Lai, C.-C., Wu, C.-R., **Chuang, C.-Y.**, Tai, J.-H., Lee, K.-Y., Kuo, H.-Yi., Shiah, F.-K. (2021). Phytoplankton and Bacterial Responses to Monsoon-Driven Water Masses Mixing in the Kuroshio Off the East Coast of Taiwan. *Frontiers in Marine Science*, 8(972).
4. Harfmann, J. L.*, Guillemette, F., Kaiser, K., Spencer, R. G.M., **Chuang, C.-Y.**, Hernes, P. J. (2019). Convergence of terrestrial dissolved organic matter composition and the role of microbial buffering in aquatic ecosystems. *Journal of Geophysical Research: Biogeosciences*, 124(10), p3125-3142.
5. Li, M., Jiang, Y.*, **Chuang, C.-Y.**, Zhou, J., Zhu, X., Chen, D. (2019). Recovery of *Alexandrium tamarens* under chronic exposure of TiO₂ nanoparticles and possible mechanisms. *Aquatic Toxicology*, 208, p98-108.
6. Li, M., Chen, D., Liu, Y., **Chuang, C.-Y.**, Kong, F., Harrison, P.J., Zhu, X., Jiang, Y*. (2018). Exposure of engineered nanoparticles to *Alexandrium tamarens* (Dinophyceae): Healthy impacts of nanoparticles via toxin-producing dinoflagellate. *Science of the Total Environment*, 610-611, p356-366.
7. Athon, M.T., Fryxell, G.E., **Chuang, C.-Y.**, Santschi, P.H*. (2017). Sorption of selected radionuclides on different MnO₂ phases. *Environmental Chemistry*, doi.org/10.1071/EN17026.
8. **Chuang, C.-Y.***, Santschi, P.H., Xu, C., Jiang, Y., Ho, Y.-F., Quigg, A., Guo, L.D., Hatcher, P.G., Ayranov, M., Schumann, D. (2015b). Molecular level characterization of diatom associated biopolymers that bind ²³⁴Th, ²³³Pa, ²¹⁰Pb, and ⁷Be in seawater: a case study with *Phaeodactylum tricornutum*. *Journal of Geophysical Research: Biogeosciences*, 120, p1858-1869.
9. **Chuang, C.-Y.***, Santschi, P. H., Wen, L.-S., Guo, L., Xu, C., Zhang, S., Jiang, Y., Ho, Y.-F., Schwehr, K. A., Quigg, A., Hung, C.-C., Ayranov, M., Schumann, D. (2015a). Binding of Th, Pa, Pb, Po and Be radionuclides to marine colloidal macromolecular organic matter. *Marine Chemistry*, 173, p320-329.
10. Yang, W., Guo, L.*, **Chuang, C.-Y.**, Schumann, D., Ayranov, M., Santschi, P.H. (2015). Influence of organic matter on the adsorption and fractionation of ²¹⁰Pb, ²¹⁰Po and ⁷Be on nanoparticles in seawater. *Earth and Planetary Science Letters*, 423, p193-201.
11. **Chuang, C.-Y.***, Santschi, P.H., Jiang, Y., Ho, Y.-F., Quigg, A., Guo, L., Schumann, D. (2014). Important role of biomolecules from diatoms in the scavenging of particle reactive radionuclides of thorium, protactinium, lead, polonium, and beryllium in the ocean: A case study with *Phaeodactylum tricornutum*. *Limnology and Oceanography*, 59(4), p1256-1266.

12. **Chuang, C.-Y.***, Santschi, P.H., Ho, Y.-F., Conte, M. H., Guo, L., Schumann, D., Ayranov, M., Li, Y.-H. (2013). Role of biopolymers as major carrier phases of Th, Pa, Po, Pb and Be radionuclides in settling particles from the Atlantic Ocean. *Marine Chemistry*, 157, p131-143.
13. Xu, C.*, Chen, H., Sugiyama, Y., Zhang, S., Li, H.-P., Ho, Y.-F., **Chuang, C.-Y.**, Schwehr, K.A., Kaplan, D.I., Roberts, K.A., Yeager, C., Brinkmeyer, R., Hatcher, P.G., Santschi, P.H. (2013). Novel Molecular-Level Evidence of Iodine Binding to Natural Organic Matter from Fourier Transform Ion Cyclotron Resonance Mass Spectrometry. *Science of the Total Environment*, 449, p244-252.
14. Yang, W., Guo, L.*, **Chuang, C.-Y.**, Schumann, D., Ayranov, M., Santschi, P.H. (2013). Sorption characteristics of ²¹⁰Pb, ²¹⁰Po and ⁷Be onto micro-particle surfaces and the effects of macromolecular organic compounds. *Geochimica et Cosmochimica Acta*, 107, p47-64.
15. Johnson, B.E., Santschi, P.H.*, **Chuang, C.-Y.**, Otsaka, S., Addleman, R.S., Rutledge, R.D., Chouyyok, W., Davidson, J., Fryxell, G.E., Schwantes, J.M. (2012). Collection of Lanthanides and Actinides from Natural Waters with Conventional and Nanostructured Sorbents. *Environmental Science and Technology*, 46, p11251-11258.
16. Chen, C. S., Anaya, J. M., Zhang, S., Spurgin, J., **Chuang, C.-Y.**, Xu, C., Miao, A., Chen, E. Y. T., Schwehr, K. A., Jiang, Y., Quigg, A., Santschi, P. H., Chin, W.-C.* (2011). Effects of Engineered Nanoparticles on the Assembly of Exopolymeric Substances from Phytoplankton. *PLOS ONE*, 6(7), e21865.
17. Xu, C.*, Zhang, S., **Chuang, C.-Y.**, Miller, E.J., Schwehr, K.A., Santschi, P.H. (2011). Chemical properties of strongly actinide binding exopolymeric substances (EPS) from two bacteria (*Sagittula stellata* and *Pseudomonas fluorescens Biovar II*). *Marine Chemistry*, 126, p27-36.
18. Ng, T.Y.T., **Chuang, C.-Y.**, Stupakoff, I., Christy, A.E., Cheney, D.P., Wang, W.-X.* (2010). Cadmium accumulation and loss in the Pacific oyster *Crassostrea gigas* along the west coast of USA. *Marine Ecology Progress Series*, 401, p147-160.
19. **Chuang, C.-Y.**, Wang, W.-X.* (2006). Co-transport of metal complexes by the green mussels *Perna viridis*. *Environmental Science and Technology*, 40, p4523-4527.
20. Wang, J., **Chuang, C.-Y.**, Wang, W.-X.* (2005). Metal and oxygen uptake in the green mussels *Perna viridis* under different metabolic conditions. *Environmental Toxicology and Chemistry*, 24(10), p2657-2664.

Selected Recent Conference/Workshop/Invited Talks

1. **Chuang, C.-Y.***, Guillemette, F., Harfmann, J. L., Kaiser, K., Spencer, R. G.M., Bergamaschi, B. A., Hernes, P. J., Parsing the DOM sources using calibrated biomarkers in the San Francisco Bay Estuary. EGU General Assembly 2020, May 4-8, 2020, Vienna, Austria
2. Ho, Y.-H., Lee, J.Y., **Chuang, C.-Y.***, Extraction kinetics of solid phase extraction of dissolved organic matter in environmental samples from various aquatic system. EGU General Assembly 2020, May 4-8, 2020, Vienna, Austria
3. **Chuang, C.-Y.***, Hernes P. J., Guillemette, F., Harfmann, J. L., Kaiser, K., Spencer, R. G.M., Bergamaschi, B. A., Parsing the DOM sources using calibrated biomarkers in the San Francisco Bay Estuaries. Interagency Ecological Program (IEP) 2019 Annual Workshop, March 5-7, 2019, Folsom, CA, USA
4. **Chuang, C.-Y.***, Role of biopolymers in the biogeochemical cycle of tracers in the sea (invited), The 7th Summer Course and Workshop on “Emerging Functional Material Science”, June 25-27, 2018, National Chiao Tung University, Hsinchu, Taiwan