

Breaking the Code:

Roadmap towards the Structural Elucidation of Unknown Organic Molecules in Complex Natural And Engineered Systems

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Abstract: The discovery of new tracers in natural and engineered systems is extremely challenging due to the complex matrices they reside in. To date, not any organic molecule outside of the direct metabolome of organisms have been described in the deep ocean and this lack of knowledge severely hampers our ability to decipher the dissolved organic matter (DOM) turnover in the deep ocean. However, this knowledge is required to accurately model the marine carbon cycle, which is a prerequisite for any attempts to use the ocean to sequester additional carbon in proposed marine carbon dioxide removal strategies. Similarly, new chemicals are continuously produced intentionally or unintentionally with potential risks to human and environmental health. For example, disinfection by-products are generated during the disinfection of portable and effluent waters, and half of the formed mostly halogenated compounds we ingest every day remain unknown at the structural level. This seminar will give an overview of a new road map to structurally elucidate unknown compounds in extremely complex mixtures with a special focus of isotopically distinct halogenated molecules that can occur naturally or are a result of disinfection.

Bio: Dr Michael Gonsior is a tenured professor at the University of Maryland Center for Environmental Science. He is a trained analytical/biogeochemist, and his research is largely focused on marine biogeochemistry and environmental chemistry. His interest is in characterizing complex dissolved organic matter (DOM) in the open ocean but also in engineered systems using modern analytical approaches such as ultrahigh resolution mass spectrometry, and optical properties characterization of chromophoric DOM (CDOM). He has applied modern analytical tools to evaluate disinfection by-products (DBPs) and discovered several hundred new DBPs. Recently, he has developed approaches to find new marine DOM tracers but also tracers for wastewater and septic effluent. Dr. Gonsior has published 97 peer reviewed publications and was a featured scientist in the award-winning documentary "A Plastic Ocean".



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