

Advances in Microplastic Study: Occurrence, Fate, Assessment, and Impacts on the Environment

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Abstract

The issue of plastic waste generation has drawn a great deal of attention since their ubiquitous existence in the environment. Plastic waste may form microplastics (i.e., < 5 mm in size) through photodegradation, mechanistic forces, climatic weathering, and biodegradation. Microplastics have been observed urban drainage, wastewater effluents, shorelines, deep oceans, high mountains, and polar regions. Due to their small sizes and potential toxicological characteristics, they were reported to be transported through atmospheric and oceanic currents and harmful to living organisms. Once entering the food web, they can be accumulated in high trophic levels of consumers. In light of the above information, this presentation summarized several investigations of ours on the related issues of microplastics, including their transport and fate under the impacts of COVID and climate change. Experimental studies on the microplastic assessment were also described. Methodologies for ambient microplastic sampling, characterization, and quantification were also introduced. To be more specific, a sampling protocol for environmental microplastics were proposed. FTIR were proved to be able to differential one microplastic from another. Optical and thermal gravity analysis were found applicable to quantify selected environmental microplastics. For risk management of microplastics, quantification of each constituent of



environmental microplastics, combining the toxicological parameter, seems necessary in risk calculation and assessment.

Biography

Dr. Chihhao Fan is a professor in the Department of Bioenvironmental Systems Engineering, National Taiwan University, Taiwan. He received his Ph. D. in Civil Engineering from Purdue University in 1997. He worked as a postdoctoral fellow at the Hydrotech Research Institute of National Taiwan University right after receiving his Ph. D. degree. After one year with Nation Taiwan University, he transferred to the Taiwan Environmental Protection Administration as an environmental engineer. In 2000, Dr. Fan joined the Ming Chi University of Technology as a faculty member, and he moved to the National Taiwan University in 2015. Dr. Fan's main research areas include watershed management, water/wastewater treatment, environmental chemistry, and water resource management. He conducted more than 80 projects in these related areas, and currently, he has been serving as a board member of several government committees.