# JSWE-IDEA Water Environment International Exchange Award

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I greatly appreciate the kind invitation to attend the 59th Annual Conference of the Japan Society on Water Environment (JSWE). I would like to express my sincere gratitude for receiving the prestigious JSWE-IDEA Water Environment International Exchange Award.

I am an associate professor in the Department of Environmental Science and Engineering at Renmin University of China. I received my B.S. degree (2014) from the School of Environmental Science and Engineering at Tongji University and my Ph.D. degree (2019) from the School of Environment at Tsinghua University under the supervision of Prof. Hong-Ying Hu. I continued my research journey as a postdoctoral researcher at Sungkyunkwan University in Korea from 2019 to 2021. I also received a prestigious Marie Skłodowska-Curie Action (MSCA) Postdoctoral Fellowship after graduating from Tsinghua. I have been working as an Assistant/Associate Professor at Renmin University of China since 2021.

My research addresses the urgent need to prevent waterborne disease. Pathogenic infections have become the second leading cause of human death (1.6 million diarrheal deaths per year). Therefore, I have developed a unique set of multidisciplinary skills in bacterial and viral cultivation/detection, nanomaterial fabrication and characterization, and energy harvesting to achieve low energy, decentralized water disinfection. I have published 40 papers in leading peer-reviewed international journals, including Nature Water, Nature Communications, Science Advances, Environmental Science & Technology, and Water Research, with >2000 citations. My work has been recognized by Prof. Menachem Elimelech (Fellow of the American Academy of Engineering) and Prof. Zhong-Lin Wang (Fellow of the Chinese Academy of Engineering) as a promising next generation disinfection technology.

At this conference, I will be giving a talk on "Walking-induced electrostatic charges enable disinfection in portable water bottles". Direct in-situ disinfection in portable water bottles could serve as the last line of defense to ensure safe drinking water. Here, we realize efficient in-situ disinfection in a portable water bottle by directly harvesting walking-induced electrostatic charges to motivate electroporation. We fabricate a polypyrrole (PPy) electrode with densely and uniformly distributed nanorods and attach it to a compact water bottle. Walking-induced electrostatic charges on the body surface can accumulate on the nanorod tips to enhance local electric fields. These accumulated charges are sufficient to motivate electroporation for complete disinfection (>99.9999%) in a water bottle within 10 minutes of walking. Since centralized water treatment is mainly used for municipal water disinfection, these technologies are not suitable for direct disinfection in water bottles before drinking. Our proposed method, motivated by walking-induced electrostatic charges, can achieve highly efficient disinfection in water bottles without relying on external power supplies. Moreover, the disinfection bottle can easily achieve in-situ water disinfection to meet the urgent need for safe drinking water in rural, isolated, or disaster-stricken areas that lack sanitation facilities and stable electricity at a low manufacturing cost (<2.0 USD for a 500-mL disinfection bottle).

Attending the conference enriched me with global research connections. By leveraging this network, I plan to strengthen collaborations with JSWE committees and researchers in the future.