

# Membrane Fouling by Nano/Micro Plastics: Challenges and Potential Mitigation Strategies

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## Abstract

The concern for the increase in microplastics in the environment has dominated recent news headlines. These microplastics can further erode and fragment into nanosized plastics, which further raises serious concerns and challenges as they are difficult to separate, characterise and quantify. The nano/microplastic contaminants in either water systems or wastewaters poses a challenge to water and wastewater treatment plants as these treatment plants are dealing with large volumes of water and wastewater, and could allow large amount of microplastics to pass through[1]. This has serious implications, both for water treatment plants that provide drinking water for people and for wastewater treatment plants where effluents are being either discharged into the environment or used as agriculture fertiliser or irrigation. Most water and wastewater treatment plants would have membrane filtration units within the processing plant and the presence of particulates such as microplastics can significantly foul membranes, causing a decrease in filtration performance[1]. A better understanding on the impact and mitigation of nano/microplastics fouling on membrane filtration units would be important for improving operation of treatment plants and separation of nano/microplastic separation using membranes. This presentation will show using microplastics sourced from a



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commercial facial scrub (i) how microplastics can easily fragment into nanoplastics [2] (ii) fouling of ultrafiltration membranes by nano/microplastics[3] and (iii) possible mitigation of the fouling via chemical surface treatment of membranes using plasma technology [4] coupled with physical air scouring [5].

**Keywords:** Fouling; Membrane; Ultrafiltration; Microplastics; Nanoplastics

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### Biography

**Dr. Judy Lee** received her double degree in B.Eng. (Chemical Engineering) and B.Sc (Physics) in 2002 and her PhD in 2006, both from The University of Melbourne, Australia. In 2007 She was awarded the JSPS Fellowship to spend two years in Japan at the National Institute of Advanced Industrial Science and Technology (AIST). She then returned to the Chemical Engineering Department at the University of Melbourne in 2010 as a postdoc for further two years before being awarded the DECRA (Discovery Early Career Researcher Award) by the Australian Research Council in 2012. In 2015 she took up an academic post at the University of Surrey as a Senior Lecturer, and is currently a Reader and Director of Learning and Teaching for the department. Her research group at Surrey is interested in both fundamental work and applied aspects of ultrasound processing and membrane filtration systems, with a particular interest in wastewater treatment.