



Jinpeng Zhou

Jinpeng.zhou@griffithuni.edu.au

orcid.org/0009-0009-5490-1991

<https://www.researchgate.net/profile/Jinpeng-Zhou-6>

Summary

'Contaminants of emerging concern' (CECs) are chemicals widely used by society (e.g., pesticides, pharmaceuticals, personal care products, flame retardants, industrial chemicals, and various environmental and disinfection transformation products), and are unintentionally discharged due to poor removal in prevailing wastewater treatment system. Consequently, chemical pollution has been one of the major threats to water quality. It is not surprising that global water bodies therefore contain a complex mixture of chemical contaminants. However, our knowledge of the biological impacts of low-level chemical mixtures that are below analytical detection limit to human is poor.

Targeted analysis (TA) and non-targeted analysis (NTA) are methods that are typically employed for the quantification and identification of chemical contaminants. However, both TA and NTA have their own limitations. For example, TA is significantly constrained by its limited detection range, as only a small fraction of pre-selected chemicals can be detected at any one time. Moreover, the detection range/limit does not reflect the current contamination level and the toxic risk to ecosystems and human health. There may be some chemicals below the analytical detection limit, that nevertheless exert biological impacts to human. On the other hand, non-targeted analysis (NTA) offers a much wider scope of analysis but lacks the capability to accurately quantify chemical concentrations in water bodies. NTA sometimes can only offers provisional identification of chemicals that are present in the sample (e.g., formula). Hence, it is difficult to extract information such as biological effects from this information alone.

Effect-based methods (EBMs), also referred to as bioanalytical tools, provide different and complementary information to chemical analyses (TA and NTA). EBM can detect the effect of mixtures of known and unknown active chemicals in a sample, although they cannot by themselves identify the individual chemicals that are contributing to the effect. Thus, the combination of EBM and chemical analysis overcomes many of their individual limitations and generate possibilities to understand the insight of how single chemicals or chemical mixtures affect human health.

Research Expertise

- LC-MS - Quantification of contaminants in enzyme sample matrix and wastewater matrix by LC-QqQ-MS; The use of solid phase extraction to aid the sensitivity and accuracy of the measurements; The use of LC-qToF-MS for non-target analysis of PFAS degradation products; Analysed data for protein identification by MS-MS.
- Molecular biology - Recombinant protein production by using the E. coli expression system; Protein purification by liquid chromatography.
- Enzymology - Nuclear Magnetic Resonance (NMR): Reaction monitoring, kinetic measurement; UV/Vis spectroscopy: Reaction monitoring, kinetic measurement; Thermal shift assay: Protein stability.