Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2020-25
Project Title:	Characterisation of the spatial and seasonal distributions of ambient ammonia and its relationship with $PM_{2.5}$ pollution in Hong Kong
Principal Investigator:	Dr Ern Mei Theodora Nah, School of Energy and Environment, City University of Hong Kong
Total Approved Grant:	$499,000
Duration:	1/9/2021 to 31/8/2023
Project Status/Remarks:	Completed
Project Scope:	This project aims – (a). To characterise the spatial and seasonal variability of ambient ammonia concentrations across different land use categories; and (b). To establish relationships between ambient $PM_{2.5}$ mass concentration and chemical composition with ammonia at an urban site. The outcomes of this project will add to a deeper understanding of air pollutants in Hong Kong, which will allow the project team to adopt appropriate strategies to improve air quality and protect public health.
Summary of the Findings/Outcomes:	Atmospheric aerosols are a serious public health issue in Hong Kong. Ammonia is the most important basic gas in the continental troposphere. It participates in atmospheric chemical reactions to form recent studies have shown that ammonia concentrations can be substantial in densely populated urban areas where agricultural activities are absent. In this study, we investigated (1) the spatial and seasonal variability of ambient ammonia concentrations across different land use categories in Hong Kong, and (2) the relationships between ambient $PM_{2.5}$ and other pollutants with ammonia at an urban site, by performing ammonia measurements at different locations in Hong Kong. Even though ammonia concentrations were the highest in urban areas with high levels of traffic, there was no seasonal dependence. In contrast, ammonia concentrations in urban areas with moderate levels of traffic spanned a wide range, but displayed seasonal dependence with higher concentrations measured during the warmer months. The ammonia concentrations at such sites were mainly governed by temperature and non-traffic emission sources. In particular, urban green spaces appeared to be an important source of ammonia in areas with moderate levels of traffic. Nevertheless, ammonia does not have a significant effect on the composition, concentration and properties of $PM_{2.5}$ in urban locations with moderate traffic levels in Hong Kong. The significance of this study is that it provides the first comprehensive seasonal measurements of ambient ammonia in different locations in Hong Kong.