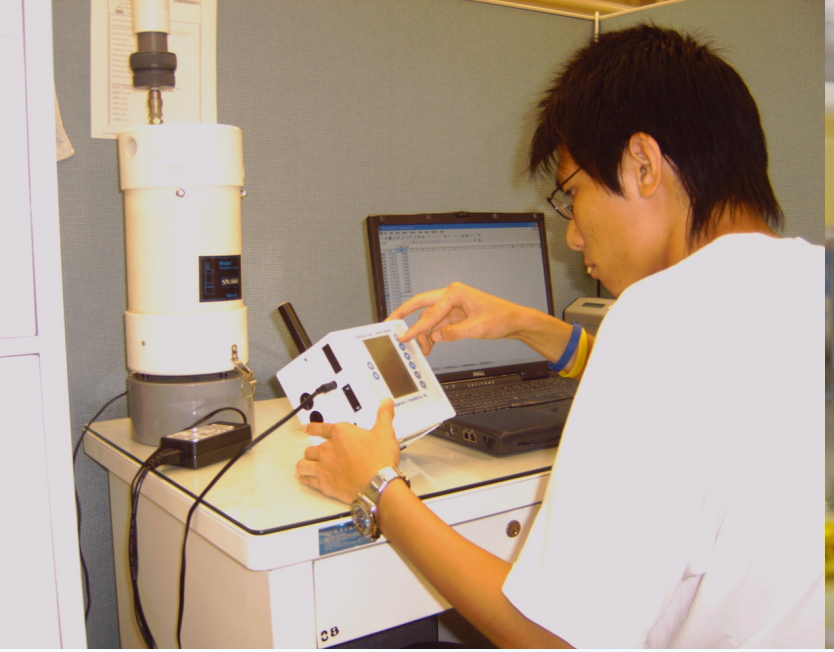

Air Pollution Laboratory

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DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
土木及環境工程學系

Opening Minds • Shaping the Future
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Introduction

Air laboratory is a well-established laboratory in providing air pollution study at institutional level and serving to general public in Hong Kong since 1982. Our laboratory has equipped with many cutting-edge air sampling equipment and analyzers for supporting innovative research projects and general laboratory-teaching experiment.

The Air Pollution Laboratory performs experiment in 3 main areas, namely criteria air pollutant measurements, volatile organic compounds and organic aerosol measurements and indoor air quality (IAQ) study.

Main Equipment and Facilities

Teledyne API Gas Analyzers for Criteria Air Pollutant Measurements

Teledyne API Ozone / Carbon Monoxide / Carbon Dioxide / Sulphur Dioxide / Nitrogen Oxides / Methane and Non-methane Analyzers provide a comprehensive criteria pollutants monitoring in the air which are considered hazardous to human health.

High Volume Air Samplers

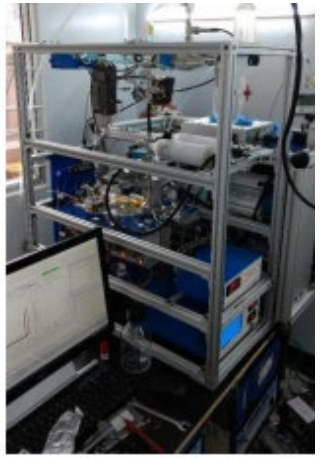
High volume air samplers are used for the collection of airborne particulate matter in ambient air. They are available for the collection of Total Suspended particulates (TSP), particulate matter with an aerodynamic diameter of less than 10μm (PM10), or less than 2.5μm (PM2.5), and semi-volatile organic compounds and pesticides (PUF).

Cape D'Aguilar (Hok Tsui) Air Monitoring Station

Cape D'Aguilar is a strategic air monitoring station in South China Sea to obtain the baseline levels of air pollutants in this region.

It helps to monitor the long range transboundary air pollution due to cold-fronts in winters or due to the storm surge in typhoons and greenhouse gases emission due to tidal movements.

Main Equipment and Facilities

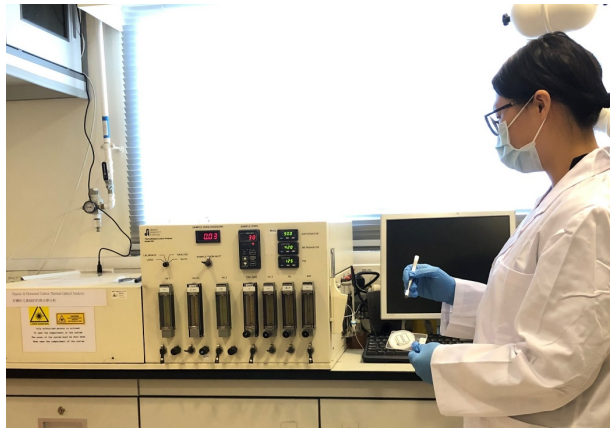


Thermo-desorption Aerosol Gas Chromatography

The Aerodyne Thermo-desorption Aerosol Gas Chromatography (TAG) automates online sampling and analysis of condensed phase (e.g. aerosol) organic compounds and eliminates the laborious sample collection, transportation, storage, and preparation process associated with filter based measurement.

Aerosol Mass Spectrometer

The Aerodyne aerosol mass spectrometer (AMS) is the only currently available instrument capable of providing quantitative size and chemical mass loading information in real-time for non-refractory sub-micron aerosol particles. The AMS couples size-resolved particle sampling and mass spectrometric techniques into a single real-time measurement system.

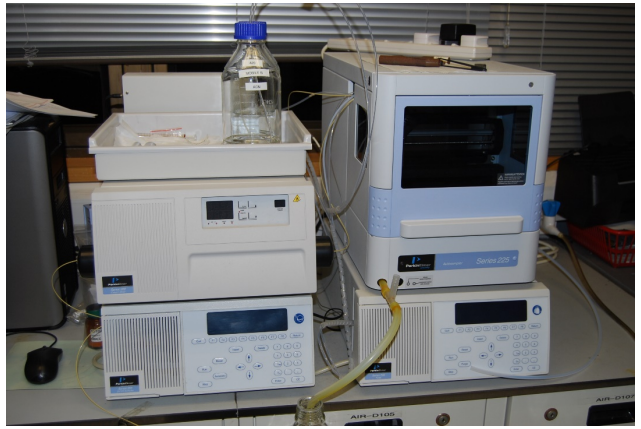


DRI 2001A Organic Carbon / Elemental Carbon Analyzer

Carbonaceous aerosols such as organic carbon (OC) and elemental carbon (EC) are detected by a 2001A carbon analyzer developed by Desert Research Institute.

The OC and EC by total optical reflectance (TOR) are insensitive to the change in temperature protocol, and therefore the long-term consistency of the IMPROVE database is conserved.

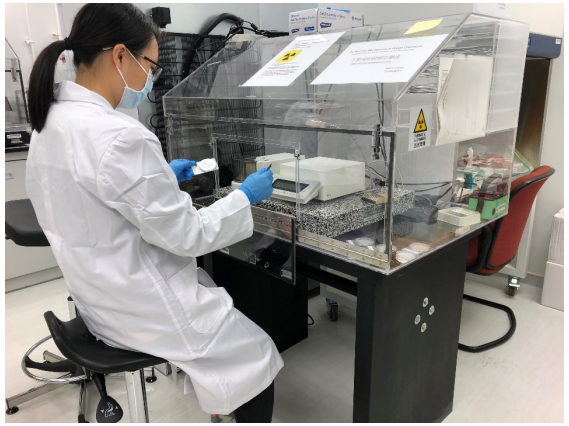
Main Equipment and Facilities



High Performance Liquid Chromatography

High-performance liquid chromatography is a technique in analytical chemistry used to separate, identify, and quantify each component in a mixture.

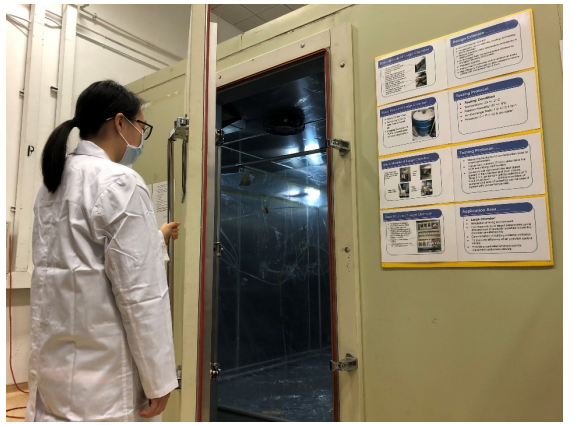
The HPLC in Air Pollution Laboratory is mainly for chemical characterization of trace-level of carbonyl compounds in air samples.



Filter Handling Room

A temperature and pressure controlled clean room meets Class 5 ISO standard, which provides a stable environment for filter handling process for aerosol study.

The gravitational analysis is done by a 6-digit Mircobalance on anti-virbration platform. It could accurately measure the mass of aerosol collected and deposited on the filter substrates.

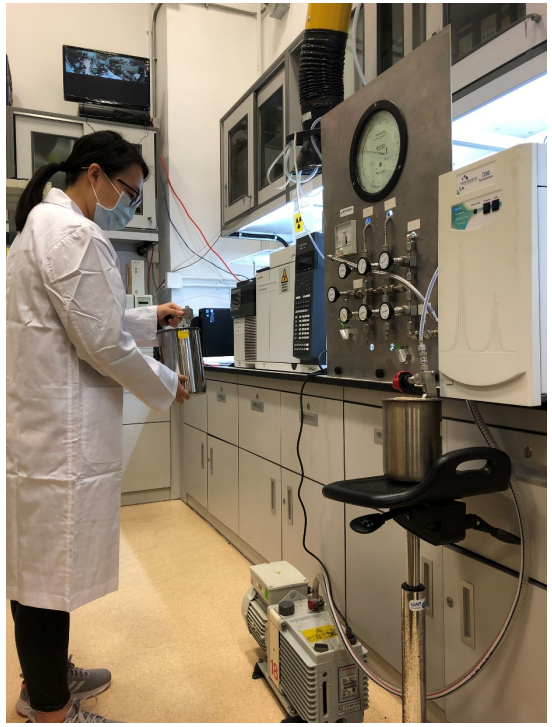


Environmental Chamber

The Environmental Chamber is a micro-environment which control temperature and humidity during measurements of pollutant emissions in indoor air and stimulation the evolution of air pollutants in ambient air.

By equipping the Teflon Air Chamber with UV sources, the Environmental Chamber can simulate the photochemical smog formation via chemical reactions of precursors in ambient air.

Main Equipment and Facilities



HP 6980 Gas Chromatography and 5977A Mass Selective Detector / Flame Ionization Detector /Electron Capture Detector equipped with Entech 7200 Preconcentrator

GC/MSD/FID/ECD are used to analyze VOCs in canister samples. This technique reaches world-class level. Inter-laboratory comparison is regularly conducted between Air Pollution Laboratory and authoritative institutions in the world.

Trace-level volatile organic compounds (VOCs) in air are analyzed by HP 6980 Gas Chromatography and Mass Selective Detection / Flame Ionization Detection / Electron Capture Detection by directly injecting transformed condensate compounds, which are preconcentrated by Entech 7200 Preconcentrator, from gas phase canister samples collected in ambient air.

With connecting to the Environmental Chamber, the VOCs compounds can be measured directly for emission measurements of indoor air studies or stimulation of photochemical smog formation studies.

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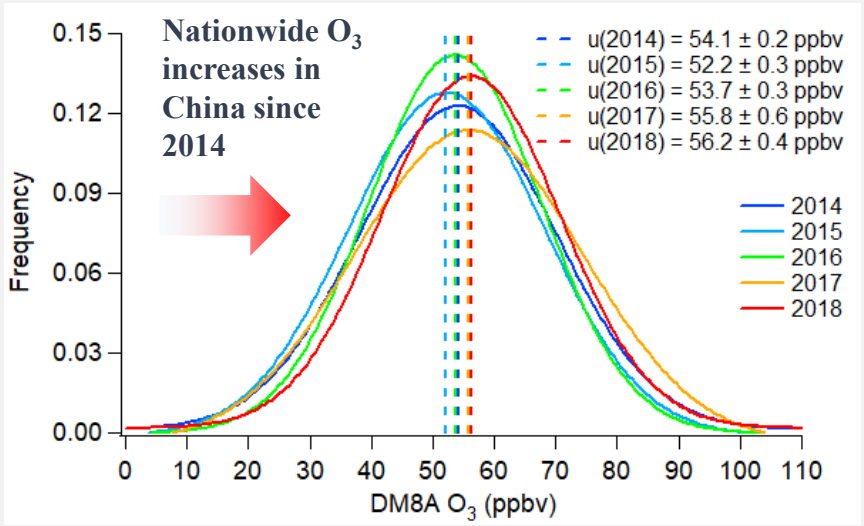
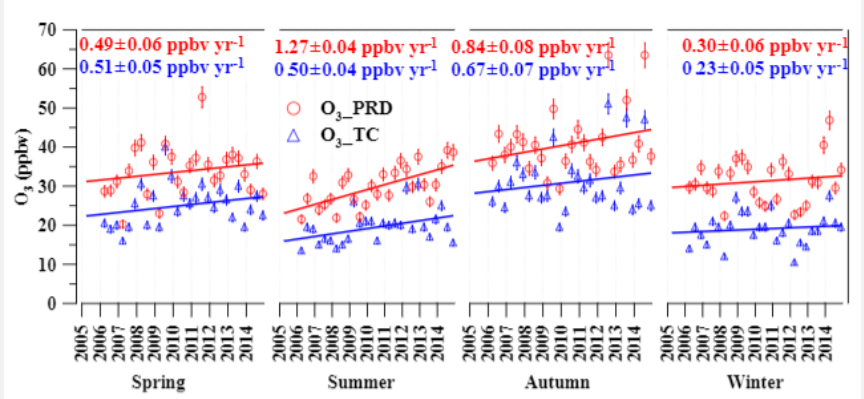
Research Spotlight

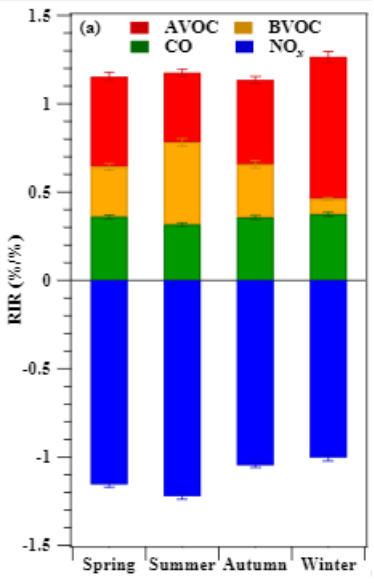
Ground-level ozone increases across China and relationships with ozone precursors



O_3 increases in PRD in last decade

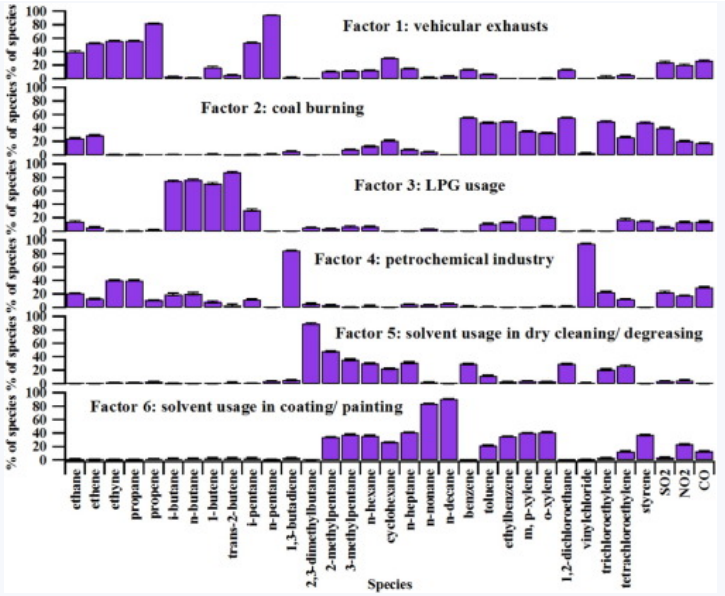


Relative incremental reactivity represents O_3-precursor relationships

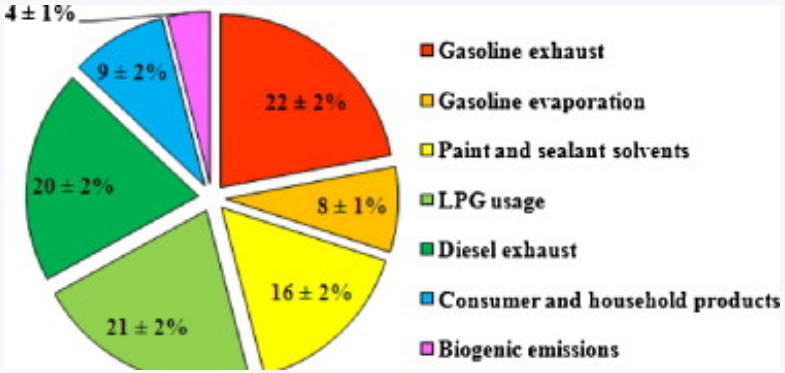


VOC-limited regime in urban areas

Sources of volatile organic compounds – receptor model applications



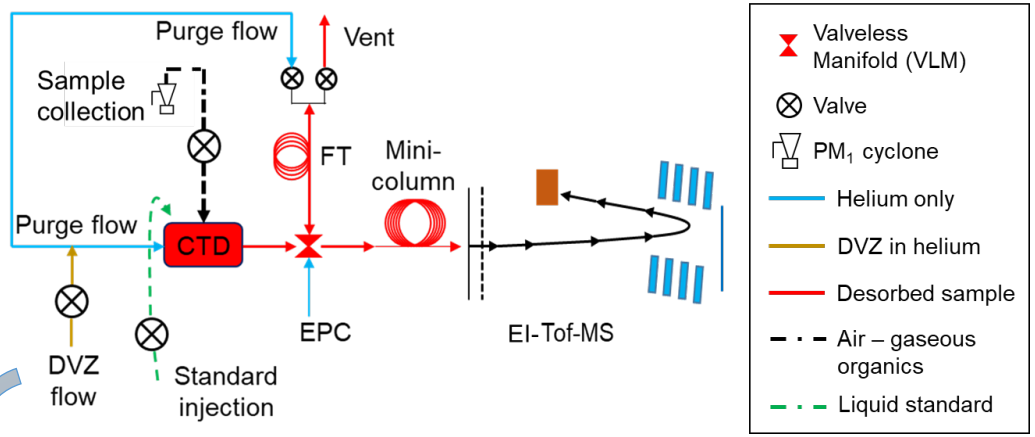
Profiles of VOC sources in Wuhan, central China



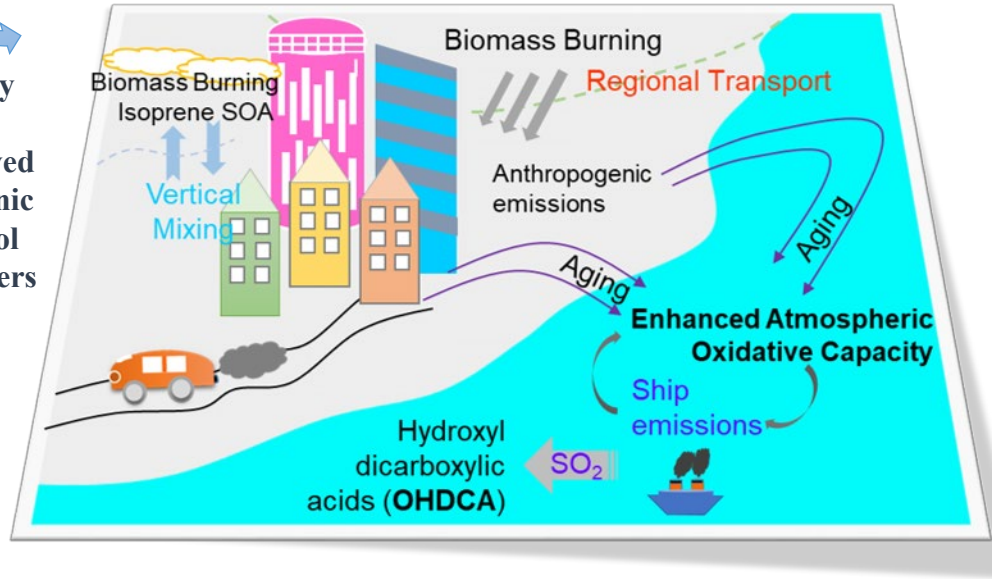
Source contributions to VOCs in Hong Kong resolved by PMF

Research Spotlight

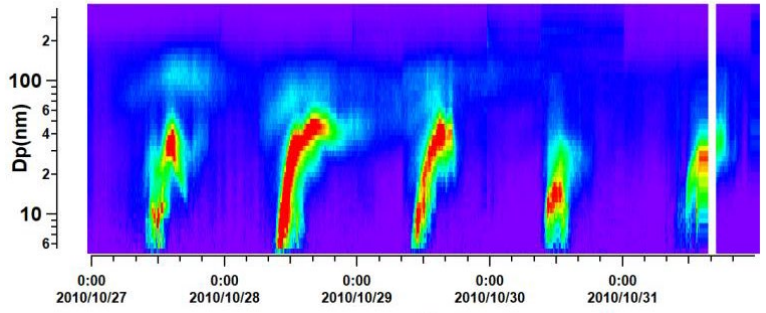
In situ measurements of molecular organic aerosol markers and dynamic sources of atmospheric organic aerosols



Highly time-resolved Organic aerosol markers

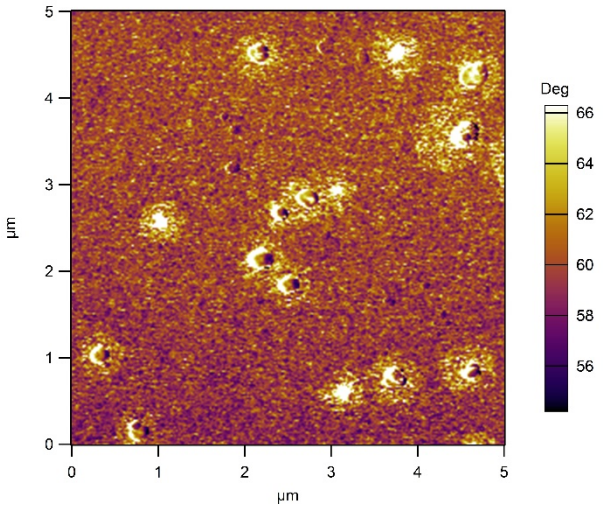


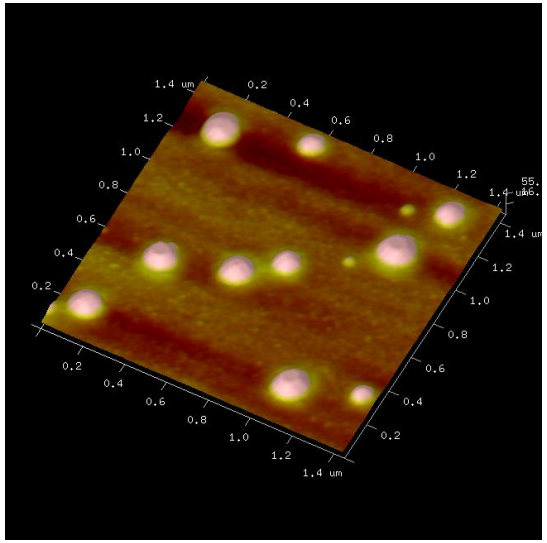
Ultrafine and acidic particles in the atmosphere



Particle number distributions in new particle formation processes

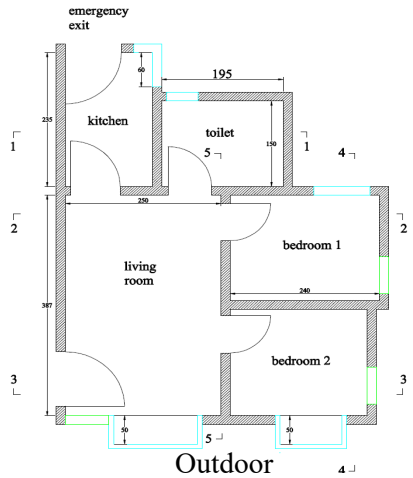
Atomic force microscopic images of acidic ultrafine particles in the atmosphere



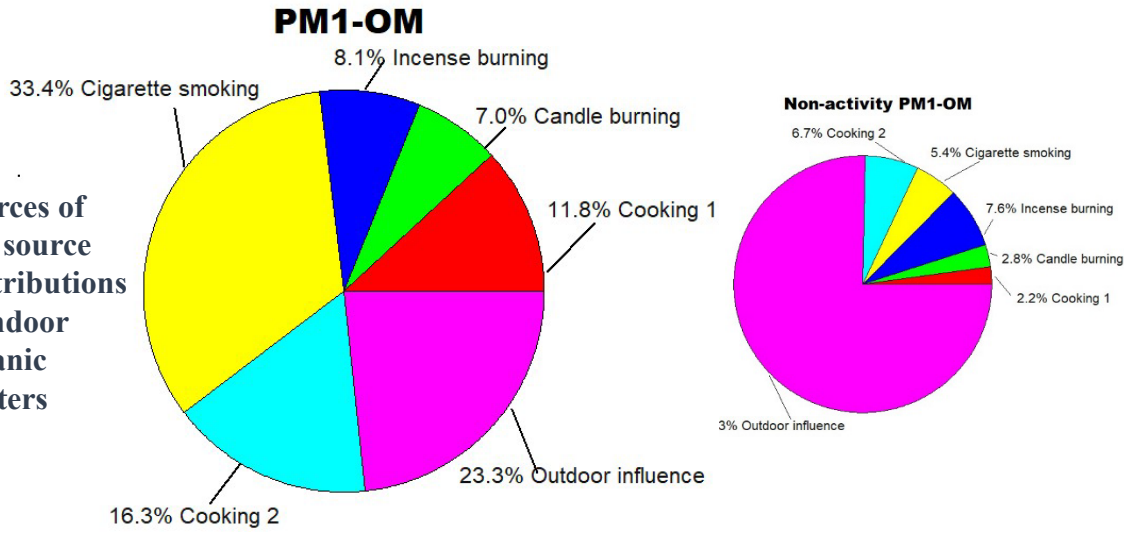


Research Spotlight

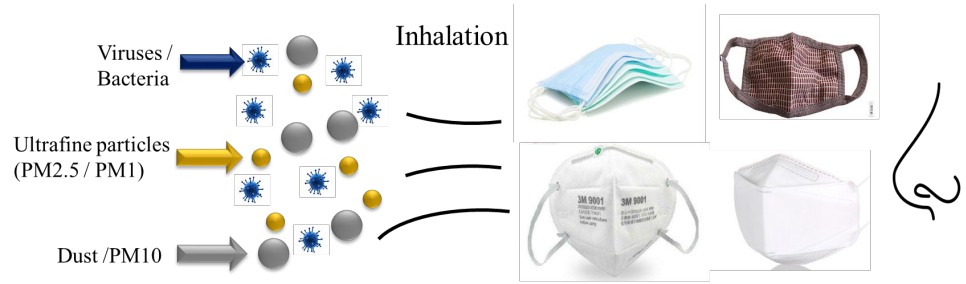
Indoor air pollution – Are we breathing healthy air at home?



Sources of and source contributions to indoor organic matters

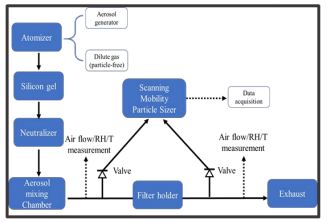


Tests of particle removal efficiency of filtration materials



Sufficient filtration efficiency?

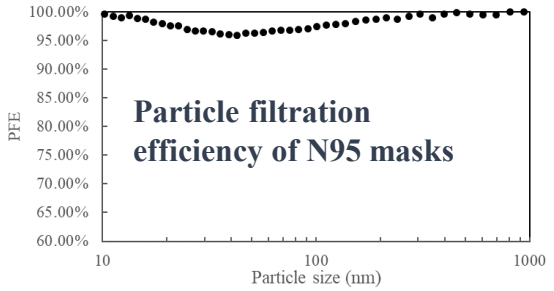
Disposable mask pollution

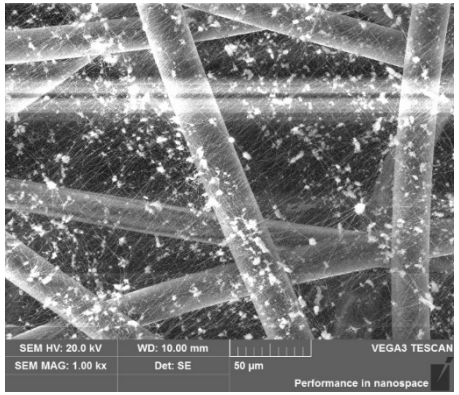


Reliable particle filtration efficiency testing system

Demand of reusable and effective mask

Morphology of PFTE membrane





Lab-in-charge and Technical Staff

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(excluding Saturday, Sunday & public holidays)