



Experimental Design and Construction of a Chamber for the Mixing of Aerosols-to Study the Transformation of Marine Aerosols

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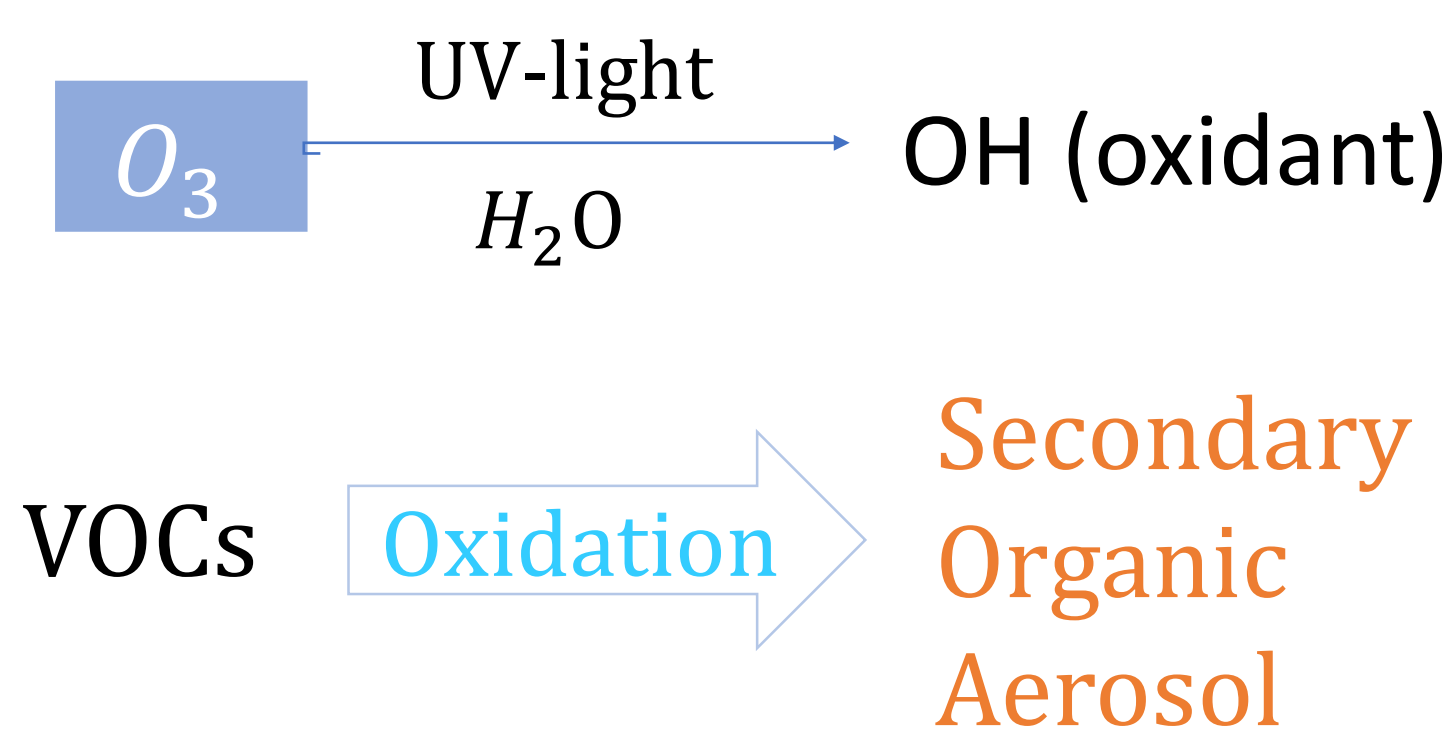
Introduction & Motivation

Atmospheric aerosols have an important impact on human health, and climate. Also, it is very important for cloud formation and rainfall. Taiwan is an oceanic island. The air quality in Taiwan is known to be affected by the photochemical production of secondary aerosols. When the events of new particle formation (NPF) occur, the number concentration of nucleation mode particles that formed from photochemical reactions is attributed to local primary pollution.

The sea spray aerosol (SSA) represents an important source of urban aerosol for a coastal city. The interactions between inland and marine air masses, caused by land-sea breeze and monsoon, make the composition of aerosol more complicated.

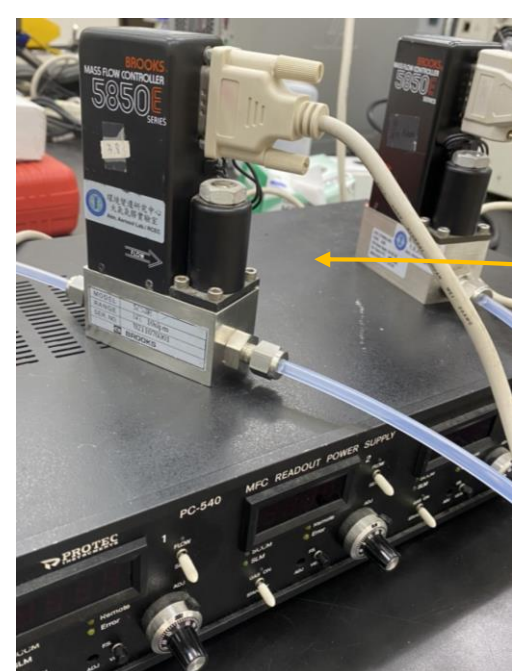
We create sea spray in a laboratory environment and mix SSA with secondary organic aerosols to study the physical and chemical characteristics of the mixture aerosols.

Formation of secondary organic aerosol:

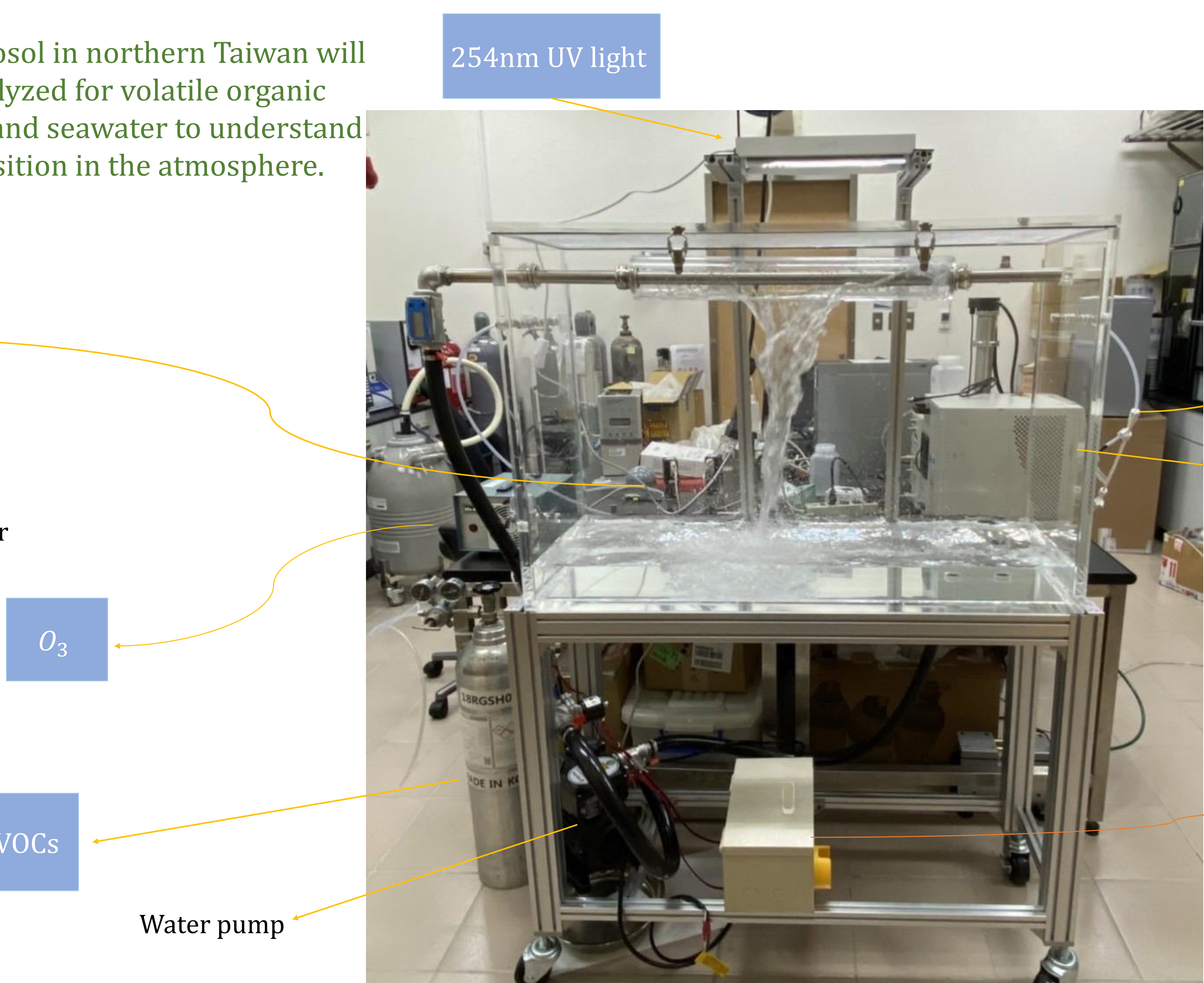


Method

The samples of aerosol in northern Taiwan will be collected and analyzed for volatile organic compounds (VOCs) and seawater to understand the chemical composition in the atmosphere.



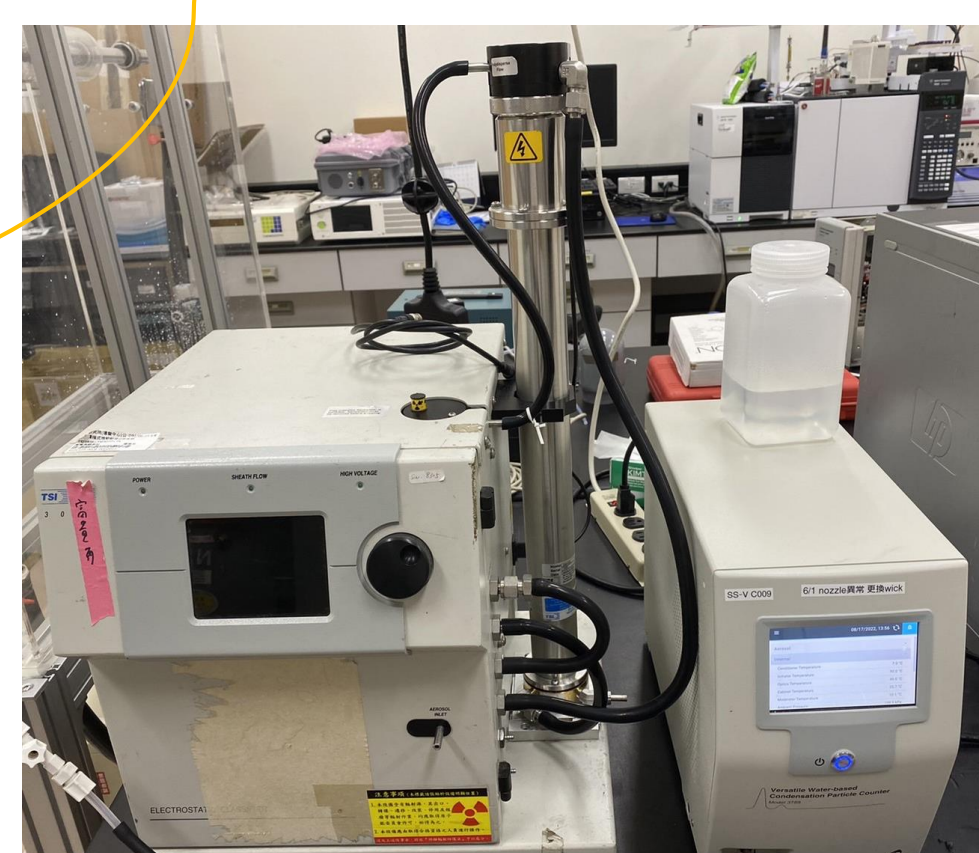
Mass Flow Controller



200L Marine Aerosol Reference Tank

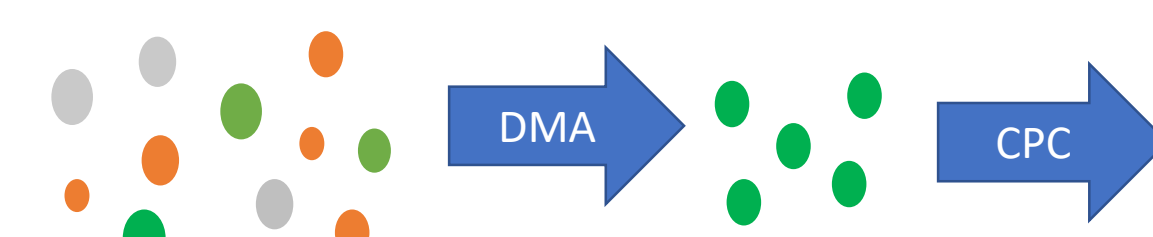


Dryer



Scanning mobility particle sizer (SMPS)

SMPS- DMA+CPC



Particle number concentration or N_x (x is particle size)



Switch and control the time when the sea water is sprayed down

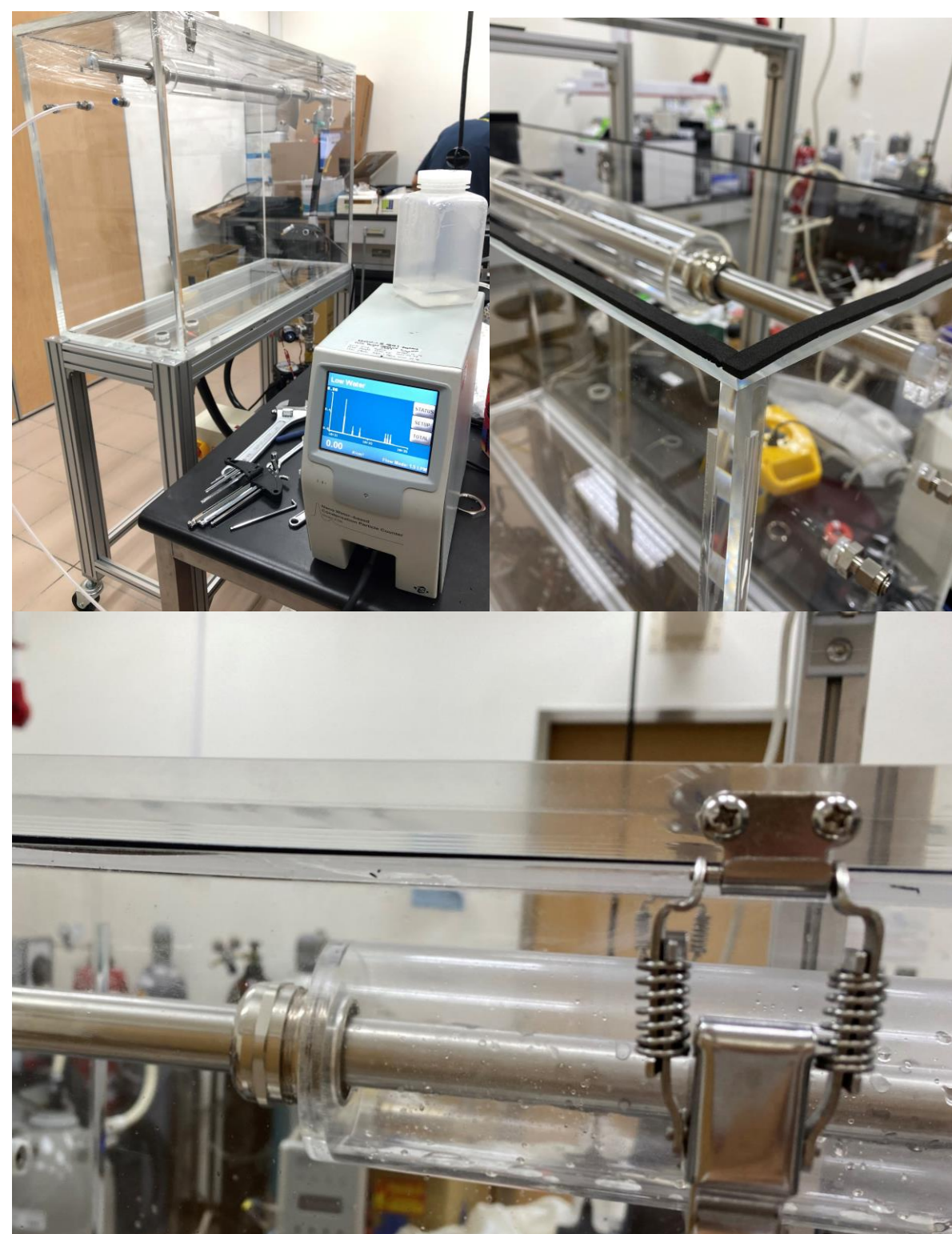
Process-Test for leak & UV light

STEP 1 Water pipe



If the water pipe leakage when turn on the motor

STEP 2 Air leak



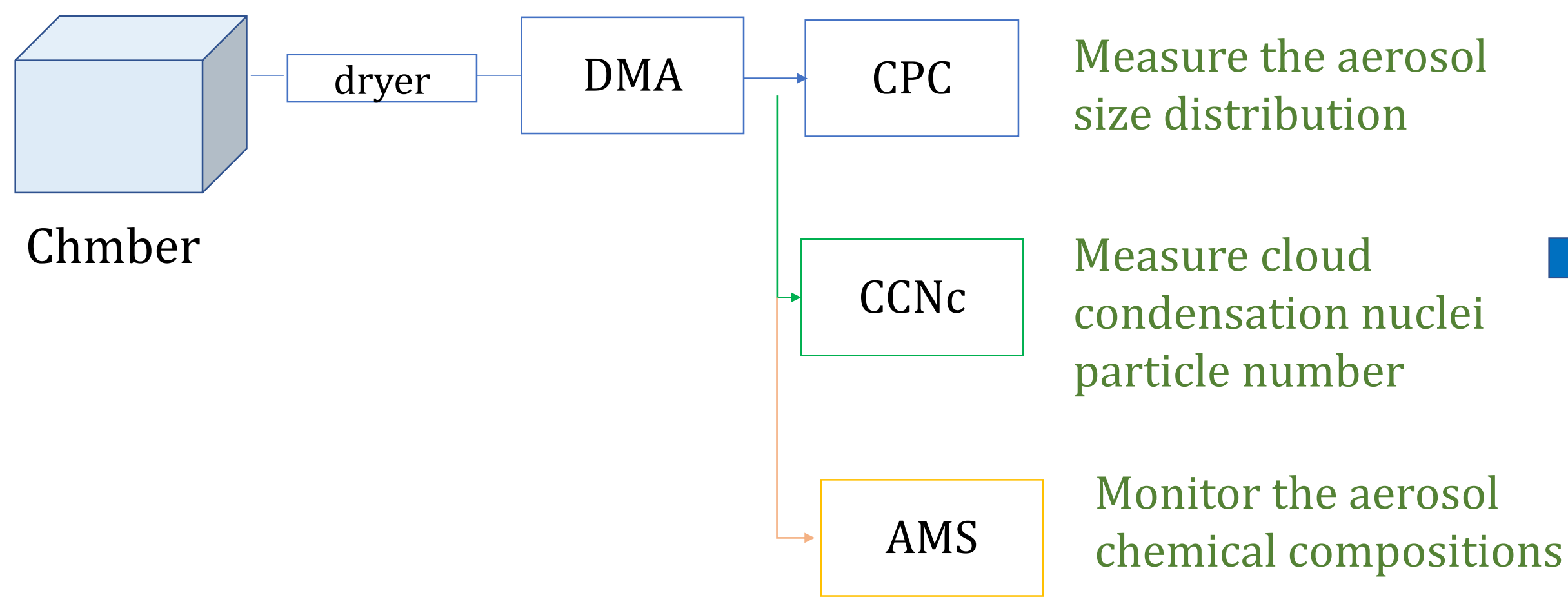
Use CPC instrument to see if the particle number has decreased over a period of time

STEP 3 UV light



Erect the UV light

Next



Fresh seawater from northern Taiwan

In ambient air

Atmospheric aerosols are a mixture of different chemical species rather than a single compound and exist in various size ranges and mixing states.

1. To measure the particle size distribution of marine aerosols mixed with volatile organic carbons VOCs Using **SMPS**
2. To measure CCN of different particles sizes using **CCNc**
3. To calculate activation Ratio (AR) = $\frac{N_{CCN}}{N_{CN}} \left(\frac{CCN}{CPC} \right)$ and the hygroscopic parameter (κ) using Köhler
4. To assess the chemical composition of the aerosols using **AMS**