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**Plain Language Summary:** To obtain precise spatial-temporal variations in carbonyl sulfide (COS) fluxes, establishing a network of observation sites and continuous COS concentration measurements are required. However, the high cost, weight, and power consumption of these laser COS instruments limit their setup at additional observation sites. In this study, we designed a continuous measurement system for observing the atmospheric COS concentration using a commercially available portable laser-based analyser. This system consumes less power than previously reported COS analysers. We applied the system to observation of COS concentration in Tsukuba, Japan for 10 days.

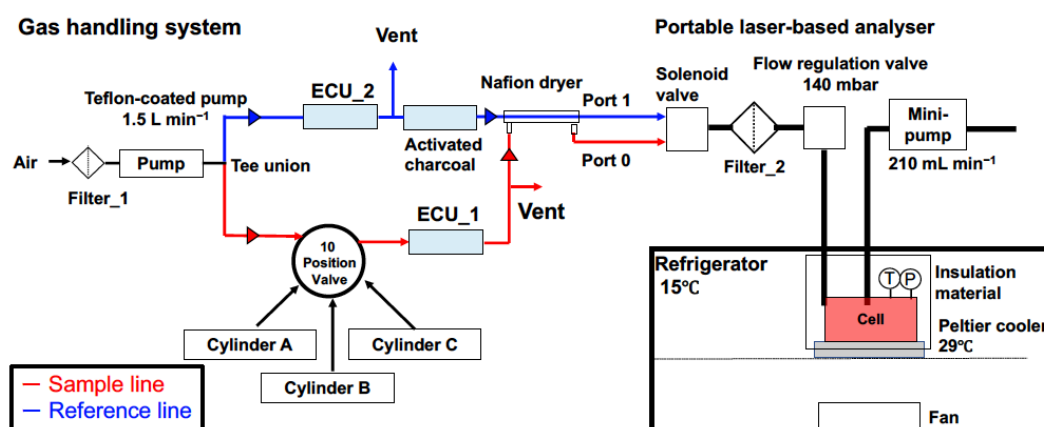


Fig. 1. Schematic diagram of the continuous measurement system for COS concentration. System components: Pump, vacuum pump; cell, optical cell; ECU, electric cooler unit; T, temperature sensor; P, pressure sensor; Solenoid valve, three-port valve.

- A continuous measurement system employing a commercially available portable laser-based analyser to measure atmospheric COS concentrations is designed.
- The analytical precision of the system was 12.1 ppt ( $1\sigma$ ) over a 15-min, allowing for sufficient characterisation of diurnal variations of the atmospheric COS concentration.
- The observed COS concentrations in Tsukuba, Japan, in April 2023 were 410–599 ppt, and backward trajectory analysis revealed that air masses with high COS concentrations exceeding 550 ppt traversed over the Keihin Industrial Zone.