

*Abstract*

# Low-Cost Sensor System for Multi-Pollutant Measurement for Exposure Assessment <sup>†</sup>

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Air pollution, both indoor and outdoor, has acute and chronic effects on human health, and air quality is affected by pollutants such as nitrogen dioxide, carbon monoxide and particulate matters. For human exposure assessment, it is crucial to understand when a person is exposed to which microenvironments under which pollutant concentration level and for how much time. Such measurement was not easy before due to the large size of the traditional monitors. However, with the rise of sensors, a portable sensor system, with the size of 36 cm length × 23 cm width × 56 cm height, was designed and developed specifically to meet this monitoring requirement for gas and particle measurement, which can operate both by 220 V mains power and an inbuilt 12 V, 20 Ah battery. Important environmental factors, for example pressure, temperature, relative humidity and GPS location, are also included. According to our previous study, gas sensors are sensitive to environmental change from temperature and humidity. To easily and effectively solve this problem, a heating module was added in the sensor system to heat the drawn gas sample to a certain level; and a Nafion tube was added to neutralize the sharp change of the humidity. More importantly, an auto-zero module constituted by air scrubbers was added to flush ‘zero’ air through sensors for baseline identification and zero correction. Tests have been carried out on the system by walking through different microenvironments and valid results have been obtained.

**Conflicts of Interest:** The authors declare no conflict of interest.



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