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Dynamic trace-moisture generator for performance evaluation on commercial cavity ring-down spectroscopy analyzer**Chia-Wei Chang and Yi-Cyun Yang**

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Amount of trace moisture in process gases supplied to semi-conductor industry is considered to be more and more crucial. To satisfy the demand for measurement of trace moisture, instrument companies have developed or manufactured a variety of analyzers. One of those analyzers which is based on Cavity Ring-Down Spectroscopy (CRDS) technique has been indicated with better performance due to its superior response time and stability from 10 nmol/mol (ppb) to 10 μ mol/mol (ppm) of moisture in nitrogen gas. However, using gas cylinders as sources of trace moisture is not a proper way to evaluate the performance of analyzers, as substantial adsorption of water molecules on the inner surface of cylinder. Instead, this study established the dynamic trace-moisture generator which employs the diffusion method to produce stable concentration of water vapor once it reaches thermal equilibrium and adsorption-desorption equilibrium. With the dynamic trace-moisture generator, a commercial CRDS analyzer was under test on real-time and the results shows that the operating wavelength of laser might not be adjusted perfectly to the absorption band of water molecule. Therefore, the measurement stability of analyzer from direct reading could be improved by roughly a factor of 3, relative standard deviation from 1.96% to 0.64% at a level of 10 μ mol/mol through a tiny region spectrum scanning. This study demonstrates a feasible manner that generates trace moisture dynamically to evaluate the performance of commercial analyzer. It could be anticipated that a further improvement of measurement based on CRDS is to resolve the molecular absorption spectrum more precisely.

Biography

Chia-Wei Chang has completed his Master's degree in Chemistry from National Tsing Hua University in 2014. He is a Researcher at Industrial Technology Research Institute and National Metrology Laboratory in Taiwan. His responsibility is establishing and maintaining the system of humidity standards in order to connect the measurement traceability chain between international and domestic standards.

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