A thermal dissociation CAPS for detection of NOy species within the MetNO2 project

Annika Kuß¹, Dagmar Kubistin¹, Robert Holla¹, Christian Plaß-Dülmer¹, Erasmus Tensing¹, Felix Utschneider¹, Maximilian Prosteder¹, David R. Worton², Stefan Persijn³, Maitane Iturrate-Garcia⁴, and Robert Wegener⁵

¹Deutscher Wetterdienst, Met. Observatory Hohenpeißenberg, Hohenpeißenberg, Germany
²Chemical, Medical and Environmental Science Department, National Physical Laboratory, Teddington, United Kingdom
³VSL Dutch Metrology Institute, Department of Chemistry, Viscosity, Pressure and Mass, Delft, Netherlands
⁴Eidgenössisches Institut für Metrologie METAS, Labor Gasanalytik, Bern-Wabern, Switzerland
⁵Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research, Jülich, Germany

As a toxic and reactive gas, nitrogen dioxide (NO₂) influences air quality and health, the self-cleaning power of the atmosphere and photochemical smog formation. Reliable scientific data with high quality and comparability are required for national and international decision-makers. The quality of the NO₂ measurements is crucially dependent on the quality of the calibration standards. In order to achieve the quality goals required, the MetNO2 project within the EMPIR (European Metrology Program for Innovation and Research) program aims to provide accurate and stable NO₂ calibration standards for operational use at air quality stations.

To characterise the impurities of the newly developed standards a Thermal Dissociation - Cavity Attenuated Phase Shift (TD - CAPS) system has been set up, based on the design from Sadanaga et al. (2016). The device includes four heated channels for the differentiation of NO₂, peroxy and alkyl nitrates and HNO₃. In parallel, a gold converter coupled with a chemiluminescence detector was deployed for detection of the total sum of NOy. First results of the performance of the TD-CAPS used for impurity analysis of NO₂ standards will be presented.

Reference: Sadanaga et al. Review of Scientific Instruments 87.7 (2016), 074102