EMPIR project IMPRESS2: metrology for air pollutant emission

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European Directives are coming into force setting increasingly stringent Emission Limit Values (ELVs) for key air pollutants and regulating emissions from large scale processes, such as power stations, all the way down to wood pellet burning domestic boilers. The current legislation will not meet WHO air quality guidelines. Therefore, work is needed on next generation techniques with significantly improved sensitivity both for in-situ stack and stand-off detection, which also requires supporting spectroscopic work, for modern sensors which are dominated by optical/spectroscopic approaches. In particular laser-based spectroscopic techniques offer the key features for future industrial stack emission measurements such as high sensitivity, sufficient chemical selectivity and compatibility with sampling-free in-situ measurement scenarios.

The EMPIR project IMPRESS2 [1] will carry out development work as well as underpinning spectroscopy also in order to monitor and enforce ELVs in future legislation. The objectives of the spectroscopic techniques within the project are as follows:

- To develop more sensitive tunable diode laser absorption spectroscopy(TDLAS) [2,3] cross-stack methods for HCl and NH_3
- To develop broadband high-resolution FTIR spectroscopy [4] with fast acquisition (speed up to 100 kHz) for NH_3 and H_2CO at stack gas temperatures
- To investigate and validate the use of novel hyperspectral techniques [5] for standoff detection and quantification of the hydrocarbons from biomass combustion
- To develop online stack emission monitoring optical isotope ratio spectroscopy (OIRS) instrument [6] for $\delta^{13}C\text{-}CO_2$ and $\delta\,^{18}O\text{-}CO_2$ for fuel source identification and classification

IMPRESS2 will address many of the current technological obstacles and enhance the control of industrial emissions within the framework of increasingly ELVs. IMPRESS2 targets measurement and monitoring technologies, methodologies and guidance to support industry and regulators as well as new CEN/ISO standards. We will outline the project spectroscopy work package research.

Acknowledgments

The authors acknowledge financial support from IMPRESS2 within the European Metrology Programme for Innovation and Research (EMPIR).

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