

Deliverable D1 - Summary Report describing the results of the study into current state-of-the-art spectroscopy methods, materials research for the effects on physical instrumentation in the presence of HCl, and investigations into determining the optimal spectral windows for HCl and water detection, including the availability of laser sources.



Deliverable D1 - Overview

One of the aims of the EMPIR MetAMCII Joint Research Project is to explore the different spectroscopic methods for measuring trace amounts of various industrially-relevant atmospheric contaminants, namely hydrogen chloride (HCl), ammonia (NH₃), and water vapour (H₂O). The focus is on developing spectroscopy instruments that are capable of detecting HCl at the sub-nmol/mol level and above. This work will culminate in the testing and development of the spectroscopic instruments for HCl detection, and then in performing comparisons, tests, and measurements using the spectroscopic instruments with the gas reference standards that are also being developed in this research project.

The aim of this Summary Report was to document the Partners' work in bringing together research and systems analysis for HCl detection in order to feed them into the implementation and improvement of the various spectroscopic instruments under development in this project.

The summary is comprised of the following:

- (1) A brief review of relevant commercial spectroscopic instruments for HCl detection and monitoring
- (2) An experimental investigation of passivation and device materials and material coatings for HCl analysis to assess the reactivity of the various components that are required in the analyser builds, especially in the presence of ppm-level HCl and other contaminants
- (3) An analysis of "spectral windows" available for addressing HCl and other relevant contaminants for HCl spectroscopy and detection, including in the presence of water
- (4) Results of tests of wavelength, linewidth, and power to ascertain suitability of commercial lasers for the various spectroscopic instruments to be developed

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