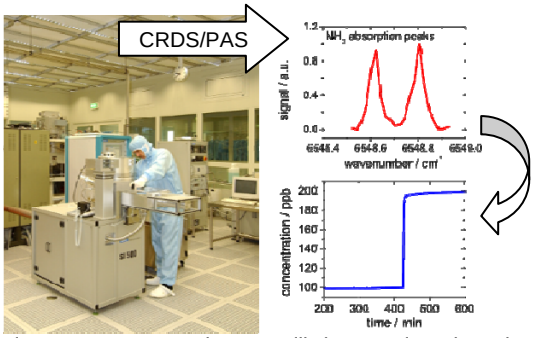
PTB Innovations
Technology Offer

EMRP
European Metrology Research Programme
Programme of EURAMET

The EMRP is jointly funded by the EMRP participating countries within EURAMET and the European Union



Clean room contaminants will be monitored and reduced.

In brief

⇒ **Determine airborne contaminants in manufacturing environments**

⇒ **Improve analytical capabilities**

⇒ **Novel reference standards**

⇒ **Stakeholders welcome**

METAMC
Metrology for airborne molecular contamination in manufacturing environments

Contacts:

Dr. Olav Werhahn (PTB contact person)
Phone: +49 531 592 3123
E-mail: olav.werhahn@ptb.de
Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig

Dr. Tuomas Hieta (project coordinator)
MIKES, Tekniikantie 1, P.O. Box 9
FI-02151 Espoo
Phone +358 505 110 058
E-mail: tuomas.hieta@mikes.fi

Partners and Associates:

MIKES, Finland (Coordination)
CMI, Czech Republic
INRIM, Italy
NPL, United Kingdom
PTB, Germany
VSL, the Netherlands
HC Photonics Corporation, Taiwan

Improving microfabrication by monitoring airborne contamination

There is a clear demand from industry for the continuous measurement and control of airborne molecular contamination (AMC). Thus, in May 2013, a € 2.9 million project was started by the European Association of National Metrology Institutes for a 3-year period to improve the detection of AMCs. The project encompasses a multitude of national metrology institutes (NMI) and other stakeholders.

Motivation

Recent progress in quantitative molecular spectroscopy has brought the detection limits of typical contaminants to ppb ("parts per billion") and even sub-ppb, a level that meets the industrial needs for AMC measurements. In particular, laser-based techniques have reached such a technical maturity that their use in an industrial environment has become realistic. However, the high adsorbtivity of the common AMCs combined, with their very low concentration, make sampling as well as transportation and the generation of calibration gases challenging.

Research

The project focuses on NH_3, HF, and HCl, which were identified as key AMCs by stakeholders. PTB is contributing with the optimization and validation of two commercial instrument types, a photoacoustic spectrometer (PAS) and a cavity ring-down spectrometer (CRDS) for ammonia (NH_3) monitoring. Both spectroscopy techniques exhibit an exceptionally high sensitivity, which enables detection limits of NH_3 in the sub-ppb range. Based on two typical instruments, the two techniques will be characterized with regard to their detection limits, precision, reproducibility and response time, as well as to their measurement uncertainty. Test measurements in a real clean-room environment are additionally planned within the scope of the project. Preparation of reference material and an additional cavity-enhanced spectroscopic method beyond the current state-of-the-art are explored at partner institutions of the PTB.

Dissemination

The results of the technical work packages will be available to the European stakeholders in the semiconductor industry, in micro fabrication, (e.g. in MEMSs), and to manufacturers of optical instrumentation. The project will provide new measurement instruments and services, by disseminating good practice guides on AMC monitoring, by organizing workshops and training courses, by participation in standards organizations or via IP protection.

www.ptb.de/emrp/ind63-project.html