

## Visiting NMI Researcher / Secondment Opportunities in the BIPM Chemistry Section

A number of secondment opportunities for visiting researchers from NMIs will be available during 2009/2010 in the BIPM's Chemistry Section, and are briefly described in this document. Secondments at the BIPM would normally be for a period of three months and upwards, but probably not exceeding 1 year. The BIPM provides an accommodation and living-expenses allowance for scientists on secondment, but other expenses including salary must be covered by the scientist's own institute. Further details on the secondment programme can be obtained from the Head of BIPM Chemistry Section, Dr R.I. Wielgosz ([rwielgosz@bipm.org](mailto:rwielgosz@bipm.org)).

### Project 1: Development and validation of dynamic methods formaldehyde in nitrogen standard generation

**Aim:** to help in the development and the validation of a dynamic facility to generate and compare formaldehyde in nitrogen standards

The BIPM is developing a primary facility for the dynamic preparation of reactive gases for which stability in cylinders can be an issue. Formaldehyde in nitrogen standards will be investigated due to their importance for the long-term monitoring and control of formaldehyde in the atmosphere. A secondment in the early stages of the project will deal with installation of the system, including a magnetic suspension balance, a gas dilution system, an automatic sampler and an analyser based on Cavity Ring Down Spectroscopy (CRDS). The project will continue with a series of validation studies to evaluate the performance of the facility, beginning with linearity and stability tests of the CRDS and comparison with FTIR measurements.

Researchers wishing to undertake the secondment project should have experience in dynamic methods for high accuracy gas standards and/or spectroscopic methods for gas analysis.

Duration of secondment: minimum 3 months (6 months preferred)

Start date: 2009/2010

### Project 2: Organic Analysis - Investigation of Novel HPLC Detection Systems

**Aim:** To investigate the applicability, limitations and method performance parameters of new detector technology intended for use in tandem with HPLC systems.

**Description:** There continues to be strong demand for improvements in the sensitivity, selectivity, and quantitative accuracy of high performance liquid chromatography (HPLC). Two new detection technologies that address different aspects of these demands have recently been commercialised for use as detectors coupled to HPLC systems:

- ◆ Atmospheric pressure photoionisation (APPI) for the detection and quantification of organic compounds using LC-MS/MS
- ◆ Charged aerosol detection (CAD) as a potential "universal" detector for HPLC.

It is proposed to examine the suitability of one of these techniques by investigating representative method performance characteristics (repeatability, reproducibility, robustness, linearity, range, detection limits, quantification limits, etc) of the detector by building on methodology and data developed in the characterisation of the measurands use to deliver the CCQM-P20.e, CCQM-P20.f and CCQM-K55.a comparisons which were coordinated by the BIPM.

Researchers wishing to undertake the project should have a good knowledge of the theory and practice of HPLC analysis. Recent experience with Agilent LC equipment and Chemstation operating software would be an advantage.

Duration of secondment: Minimum of 3 months

Start date: 2009/2010

### **Project 3: Development and validation of a Comparison facility for Methane in Air Standards using GC-FID and CRDS**

**Aim:** To develop and validate a facility for the comparison of primary standards of methane in air based on gas chromatography (GC-FID) and Cavity Ring Down Spectroscopy (CRDS)

Methane in ambient air is the second most important greenhouse gas after carbon dioxide. The results of CCQM-P41 (2003) demonstrated a discrepancy between the WMO Methane scale and the reference value of the comparison, interpreted as the best estimate of the SI value. The project will develop a facility at the BIPM that will allow the international comparability of methane in air standards to be redetermined, and will also be the basis of a comparison for the CCQM GAWG.

Within this project a CRDS facility will be established and validated for the measurement of methane in air under repeatability conditions to minimise analytical measurement uncertainty. The performance of the system will be compared to the BIPM's GC-FID facility.

Researchers wishing to undertake the study will require experience in the use of spectroscopic and or GC systems for gas analysis.

Duration of secondment: minimum 3 months (Preferred period 6 months)

Start date:

Start date: 2010

### **Project 4: Organic Analysis - Characterisation of Primary Calibrators**

**Aim:** To apply and develop methodology for the characterization of high purity primary calibrator materials required for future CCQM key comparisons

The BIPM coordinates CCQM comparisons that investigate the competencies of NMIs to deliver Primary Calibration Reference Services for Organic Analysis. The CCQM-K55 series of comparisons looking at the characterisation of pure substance materials required for use as primary calibrators commenced in 2008. A complementary comparison of capabilities for the

assignment of the mass fraction content of an organic analyte in solution has been proposed to commence in 2010.

Researchers are currently sought to assist the BIPM to undertake the characterisation of high-purity materials required for future rounds of these comparisons. The projects are intended to test and improve the applicability of the BIPM approach for purity assignment by mass balance (summation of impurities) approaches. Researchers will have access to the dedicated equipment of the BIPM Organic Analysis facility (RPLC, LC-UV, GC-MS, Karl Fischer titration, TGA) to obtain the analysis and characterisation data.

Likely compounds for investigation include aldrin, tetracycline and selected amino acids.

Researchers wishing to undertake the project should have a good knowledge of the theory and practice of HPLC and GC analysis. Recent experience with Agilent LC equipment and Chemstation operating software would be an advantage.

Duration of secondment: Minimum of 3 months

Start date: 2010

For further information on the secondments, please contact:

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