



VAMAS

Raman Spectroscopy and Microscopy

Technical Work Area 42

Project 7

Protocols for relative intensity calibration of Raman spectrometers

Objectives

- Obtaining relative intensity calibration for a Raman spectrometer, including polarization dependent response and an estimate of error.
- Facilitating the comparison of Raman spectra acquired on different instruments

Background

Dr. Ankit Raj (Gakushuin University, Japan) with the support of National Metrology Institutes has initiated the project “*Method development and validation for relative intensity calibration of Raman spectrometers*” under the VAMAS Technical Work Area (TWA) 42. This project continues the ongoing efforts towards establishing a reliable protocol for relative intensity calibration, and which includes polarization correction as well. This project aims to validate the proposed protocol among the participating laboratories and refine the technique based on the obtained results.

Measurement Methods

Specific protocols involve measuring standard and commonly available liquid samples, together with a broadband light source. Measurement conditions are to be optimized for high SNR data which will be analyzed to extract out the instrument response function.

Standardisation Needs

Raman spectroscopy is undergoing rapid progress in applications relevant to industry, medicine as well as chemical and physics research. However, there is poor comparability between results from different instruments and between different laboratories with regard to the Raman intensities.

The measured Raman intensities are dependent on the incident laser and optical configuration as well as polarization response, which differ from machine to machine. Thus, there is an urgent need to address this variability via establishment of protocols for intensity calibration.

Work Programme

Lead will prepare the broad band light source which will be shipped to the project participants for measurement. Liquid samples (of required quality) will be sourced by the participants. Sets of measurements on these will be made as per the protocol and shared. Data analysis will be made to obtain the instrument response (for parallel and perpendicular polarizations).

Statistical analysis of the results from participants will be conducted as consistent with ISO/TS 5725.

Call for Participation

Sample	Data analysis procedure and outcome
Broadband white light source	Least-squares fit to get first set of sensitivity information (\parallel and \perp polarizations)
Organic liquids (benzene, cyclohexane, CCl ₄ , benzonitrile, toluene)	Least-squares fit of band area ratios to get second round of sensitivity information, and Raman depolarization ratios (\parallel and \perp polarizations) Validation by comparison of relative intensities and/or Raman thermometry

Fig. 1: Proposed protocol for relative intensity calibration under this project

Deliverables and Dissemination

Results of the inter-laboratory study will be disseminated at scientific conferences and peer-reviewed journal article acknowledging the participants with co-authorship of those that contribute with data analysis and manuscript writing. The results will be used to improve the protocols under study and update two related [CWAs](#), with the final aim of proposing their further standardization.

International Participation

Current participants include organisations from countries from EU, US, UK, Canada, Brazil and Japan. Additional participants are welcome to join.

Funding

Participants fund their own involvement in the project. The lightsource sample holder will be shipped to the participant. Detailed information for the required liquid samples (to be acquired by the participants) will be provided.

Status

The project is due to start on 30th July 2025 and finish by June 2026.

For more information:

Project Leaders:

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Registration link

<https://forms.office.com/r/TvpXWtMFhk>

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