

# EURAMET Project Form "Report"



Status: ☐ progress report ☒ final report

1. Ref. No.: 894	2. Subject Field: Amount of substance
3. Type of collaboration: Cooperation	
3A. In the case of a comparison: Registered as Key comparison (KC) or Supplementary Comparison (SC) in the KCDB: <input checked="" type="checkbox"/> no <input type="checkbox"/> yes If yes: No. of KC/SC:	
4. Participating Partners: 4A EURAMET members or associates (Institute's standard acronym with country code in brackets) PTB (DE), NPL (UK)  4B Institutes not being EURAMET members or associates (Institute's full name and name of the country)	
5. Title: SERS based metrology at a primary level	
<p>6. Progress:</p> <p>Regular Gold nanoparticle arrays with sub-10-nm gaps to be used as substrates for surface-enhanced Raman scattering (SERS) have been developed, prepared and characterized.</p> <p>The development was driven by numerical calculations according to the finite-difference time-domain (FDTD) method. These simulations show that the strongest local electric fields are localized in the junction region of the nanoparticles and that as the interparticle distance decreases the electric field strength and the expected signal enhancement factor increases. Simultaneously, the main resonance peak shifts to longer wavelengths.</p> <p>Fabrication of such periodic nanoarrays requires to go beyond the 20 nm resolution limit obtainable with common electron beam lithography (EBL) preparation schemes. Considerable reduction of the interparticle gap-size down to 5-10 nm has been achieved by applying EBL in combination with the so-called shadow-evaporation method. This technique uses a free-standing Ge evaporation mask through which two metal patterns are deposited sequentially at different angles (+/- 5°) between evaporation source and sample.</p> <p>The new nanoparticle arrays show good SERS activity and allow the detection of clinical analytes (urea, creatinine) at their relevant concentration levels. For creatinine, a first quantitative evaluation according to the principle of isotope-dilution (ID-SERS) was carried out using a single chip. It comprises a full assessment of the measurement uncertainties.</p> <p>Two publications resulting from this research project are in progress.</p>	
<p>7. Coordinator's name: Dr. Bernd Guettler</p> <p>Address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig Germany</p> <p>Telephone: +49-531-592 3100 Fax: +49-531-592-3015 E-mail: bernd.guettler@ptb.de</p>	
8. Completion Date: 31 May 2009	9. Date 13 January 2010

*Notes for completion of the form overleaf*

## NOTES FOR THE COMPLETION OF THE FORM (numbers refer to boxes overleaf)

### IMPORTANT:

Forms are to be send to the EURAMET Secretariat ([secretariat@euramet.org](mailto:secretariat@euramet.org)) as word or pdf file by TC Chair or coordinator of the project with copy to TC Chair.

- 1 Ref. No.** The project reference number which is assigned by the EURAMET Secretariat and on which progress is being reported.
- 2 Subject Field** The field specified on the EURAMET Project Form "Proposal"
- 3 Type of collaboration** The field specified on the EURAMET Project Form "Proposal"
- 4A EURAMET members or associates** Any institutes which have participated in the collaboration should be indicated in alphabetical order using their standard acronyms and country codes.
- 4 B Institutes not being EURAMET members or associates** should be indicated with full name in alphabetical order. See country codes in the last section of the directory. Every effort should be made to establish potential partners prior to completing a Proposal Form.
- 5 Title** The title given in the EURAMET Project Form "Proposal".
- 6 Progress** A brief description of the progress should be entered in the space provided. Comments on the advantages of undertaking the work collaboratively through EURAMET would be useful. Completion of this Report is not deemed as publication of the work. Collaborators are encouraged to publish their work through normal channels, mentioning it was undertaken as a EURAMET collaboration.
- 7 Coordinator** The Coordinator is the person who is appointed as the contact point for the project detailed overleaf. The name, full postal address, telephone and fax numbers and e-mail address of the coordinator should be given.
- 8 Completion Date** If the progress of a project is being reported on this form then an estimate of the completion date should be made. If the project has now been completed then the actual date of completion should be given. For permanent agreements (e.g. development of primary standards) "ON-GOING" should be entered.
- 9 Date** of transmission to EURAMET Secretariat.