



# NanoScale 2013

## Seminar on Quantitative Microscopy and Nanoscale Calibration Standards and Methods

### Programme

April 25<sup>th</sup> 2013

#### Registration and Welcome

8:00 Registration  
9:00 Welcome by LNE

#### Activities of ISO/TC 201/SC 9 SPM

14:00 3.1 SPM standardization in ISO/TC 201/SC9  
Prof. Haesong LEE  
Chairman of the ISO/TC 201/SC9 Scanning Probe Microscopy  
Department of Nanomaterials Engineering, Jeonju University, Jeonju 560-759, Republic of Korea

#### 1<sup>th</sup> Session

9:10 1.1 Performance evaluation of metrological Scanning Probe Microscope with integrated heterodyne interferometry  
B. Babic, C. Freund, M. T. L. Hsu, M. B. Gray and J. Hermann  
National Measurement Institute Australia, Lindfield NSW 2070, Australia

9:30 1.2 New concept of long-range Scanning Probe Microscope stage based on mechanism with stuck planchets  
O. Čip, M. Čížek, J. Hrabina, V. Hucl, Š. Řeřucha, J. Lazar 1)  
P. Konečný 2)  
M. Valtr, A. Campbellová, P. Klapetek 3)  
1) Institute of Scientific Instruments Academy of Sciences of the Czech Republic, Královopolská 147, 61264 Brno, Czech Republic  
2) MESING, s.r.o., Šámalova 60a, 61500 Brno, Czech Republic  
3) Czech metrology institute, Okružní 31, 63800 Brno, Czech Republic

9:50 1.3 Development of a motorized scanning stage for a large range metrological atomic force microscope  
M. Lu, S. Gao, W. Li, Y. Shi, Q. Li  
National Institute of Metrology (NIM), Beijing 100013, China

10:10 Coffee **Poster**

10:50 1.4 An approach towards 3D sensitive AFM cantilevers  
K.R. Koops, V. Fokkema  
VSL Dutch Metrology Institute, Thijsseweg 11, 2629 JA Delft, The Netherlands

11:10 1.5 Design and proof of concept of a novel 3D vibrating probe  
M.C.J.M. van Riel, E.J.C. Bos 1)  
M.C.J.M. van Riel, F.G.A. Homburg 2)  
A.H. Dietzel 3)  
1) Xpress Precision Engineering, Horsten 1, 5612 AX Eindhoven, The Netherlands  
2) Eindhoven University of Technology, P.O. box 513, 5600 MB Eindhoven, The Netherlands  
3) Technical University Braunschweig, 38092 Braunschweig, Germany

11:30 1.6 Comparison of a homodyne interferometer and optical resonator with common measuring arm: the scale nonlinearity and resolution limits under atmospheric conditions  
M. Čížek, R. Šmíd, V. Hucl, B. Mikel, J. Hrabina, J. Lazar and O. Čip  
Institute of Scientific Instruments, Academy of Sciences of the Czech Republic  
Královopolská 147, 61264 Brno, Czech Republic

11:50 Lunch **Poster**

#### Poster Session

13:00 – 14:00 **POSTER SESSION**

#### 2<sup>nd</sup> Session

14:25 2.1 Self-consistent determination of line width and probe shape using atomic force microscopy  
B. J. Eves, R. G. Green  
National Research Council Canada, 1200 Montreal Rd, Ottawa, Ontario, K1A 0R6

14:45 2.2 Accurate and traceable CD metrology based on CD-AFM and TEM  
G. Dai, K. Hahm, J. Fluegge, H. Bosse  
Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig, Germany

15:05 Coffee **Poster**

15:25 2.3 Investigations of the influence of common approximation in scatterometry for dimensional nanometrology  
J. Endres, A. Diener, M.-A. Henn, S. Heidenreich, M. Wurm, B. Bodermann  
Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig, Germany

15:45 2.4 Traceability for AFM roughness measurements  
T. Dziomba, P. Krebs, A. Felgner, R. Krüger-Sehm, H.-U. Danzebrink, L. Koenders  
Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig, Germany

16:05 2.5 Development of reference roughness specimens for surface metrology via scanning probe microscopy  
Y. Chen, W. Huang, T. Luo, X. Liu  
Department of Precision Machinery and Precision Instrumentation, University of Science and Technology of China, Hefei 230026, China

16:25 Coffee **Poster**

16:50 2.6 Low-cost artefacts for ISO-compliant calibration of surface topography measuring instruments  
C. Giusca 1), R. Leach 1), M. Guttmann 2), P.-J. Jakobs 2) K. Fickens 3), O. Riemer 3), P. Rubert 4)  
1) Engineering Measurement Division, National Physical Laboratory, Teddington, Middlesex TW11 0LW, UK  
2) Karlsruhe Institute of Technology, Institute of Microstructure Technology, 76344 Eggenstein-Leopoldshafen, Germany  
3) Laboratory for Precision Machining, University of Bremen, 28359 Bremen, Germany  
4) Rubert + Co Ltd, Cheadle, Cheshire SK8 2PG, UK

17:10 2.7 Novel method for dimensional measurements of nanorelief elements based on electron probe defocusing in scanning electron microscope  
M.N. Filippov, V.P. Gavrilenko, V.B. Mityukhyaev, A.V. Rakov, P.A. Todua  
Center for Surface and Vacuum Research, 40 Novatorov street, 119421 Moscow, Russia

17:30 2.8 Reconstruction of 3D structures using photogrammetry and shape from shading technique in an SEM  
P. Cizmar, G. Dai, K.-P. Johnsen, C. G. Frase, H. Bosse 1)  
M. Prantl 2)  
1) Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig, Germany  
2) Alicona Imaging GmbH, Dr. Auner-Straße 21a, 8074 Raaba/Graz, Austria

April 26<sup>th</sup> 2013

8:00 Registration

#### 4<sup>th</sup> Session

8:30 4.1 Nanoparticle packing model for lateral AFM size calibrations  
F. Meli  
Swiss Federal Office of Metrology (METAS), Lindenweg 50, 3003 Bern-Wabern, Switzerland

8:50 4.2 Size and mechanical properties of polystyrene nanoparticles  
L. Garnæs  
DFM - Danish Fundamental Metrology, Matematiktorvet 307, 2800 Lyngby, Denmark

9:10 4.3 Validity of elastic mechanical models for AFM force Measurement  
S. Fujinami, M. Ito, K. Nakajima  
WPI Advanced Institute for Materials Research, Tohoku University, 2-1-1 Katahira, Aoba-ku, Sendai, Japan

9:30 4.4 A novel approach to estimate deformations of adsorbed nanoparticle sizing  
K. Dirscherl  
Danish Fundamental Metrology, Matematiktorvet 307, 2800 Kgs. Lyngby, Denmark

9:50 Coffee **Removal of poster**

10:30 4.5 Towards quantitative modelling of surface deformation of photoresist micro-structures under tactile measurement  
Z. Li, U. Brand and T. Ahbe  
Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig, Germany

10:50 4.6 Scatterometric characterization of diffractive optical elements  
H. Husu, A. Lassila 1), T. Saastamoinen, J. Turunen 2), S. Siitonen 3)  
1) Centre for Metrology and Accreditation (MIKES), P.O. Box 9, 02151 Espoo, Finland  
2) University of Eastern Finland, P.O. Box 111, 80101 Joensuu, Finland  
3) Nanocomp Oy Ltd, Ensolaantie 6, 80710 Lehmo, Finland

11:10 4.7 Overcoming diffraction limit in 3D white light interferometer  
M. Novak 1), S. Lesko 2)  
1) Bruker Nano, 3400 East Britannia Drive Suite 150, 85706 Tucson, AZ, USA  
2) Bruker Nano, 7 rue de la Croix Martre, 91120 Palaiseau, France

11:30 4.8 A new calibration tool for fluorescence microscopy  
A. Royon and G. Papon  
Argolight SA, Building C5, Domaine du Haut Carré, 351 Cours de la Libération, 33405 Talence, France

11:50 Final remarks and closing

12:00 Lunch

13:00 – 17:00 Tour to LNE Paris and Trappes

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