SECOND CONFERENCE ON
FRONTIERS OF ABERRATION
CORRECTED ELECTRON MICROSCOPY

and

Colloquia Honouring
Owen Saxton and David Smith

Kasteel Vaalsbroek
9 – 12 October 2013

Conference Organisers
Rafal Dunin-Borkowski (Jülich)
Hannes Lichte (Dresden)
Karsten Tillmann (Jülich)

PROGRAMME
SECOND CONFERENCE ON FRONTIERS OF ABERRATION CORRECTED ELECTRON MICROSCOPY

and

Colloquia Honouring
Owen Saxton and David Smith

Kasteel Vaalsbroek
9 – 12 October 2013

ORAL PROGRAMME
PROGRAMME

WEDNESDAY 9 OCTOBER 2013

1200-1600  ARRIVAL of delegates under own auspices and CHECK-IN at the Hotel Reception Desk after 1400 hrs (after 1200 hrs for overseas travellers)

1400-1600  CONFERENCE REGISTRATION at the “Woonkamer” room of the Castle

1545-1630  WELCOME RECEPTION in the “Binnenplaats” in front of the Castle or in the “Kelders” of the Castle dependent on weather conditions

SESSION A¹  BASIC PHENOMENA AND TECHNIQUES
 Chair: John Spence

1630-1645  Welcome Address
 Harald Bolt, Member of the Board of Directors of the Jülich Research Centre (Germany)

Opening Remarks
 Rafal Dunin-Borkowski, Jülich Research Centre (Germany), and Hannes Lichte, Dresden University (Germany)

1645-1720  A1  Elastic and inelastic electron scattering in the near field region
 Archie Howie, University of Cambridge (UK)

1720-1755  A2  Ptychography – Easy with X-rays, hard but promising with electrons
 John Rodenburg, University of Sheffield (UK)

¹ All conference sessions will be held in the Morettipaviljoen on the ground floor of the castle.
1755-1830  A3 Holographic imaging and optical sectioning in the aberration-corrected STEM
Harald Rose, University of Ulm (Germany)

1830-2000  DINNER in the “Kruidentuin” restaurant

2000-2130  POSTER SESSION A in “Vaalsbroekerhof”

THURSDAY 10 OCTOBER 2013

SESSION B  ADVANCED INSTRUMENTATION
Chair: Ulrich Dahmen

0900-0935  B1 An improved correction system for ultra-high resolution TEM
Max Haider, CEOS GmbH – Heidelberg (Germany)

0935-1010  B2 EFTEM at atomic resolution in the chromatic aberration corrected transmission electron microscope
Knut Urban, Jülich Research Centre (Germany)

1010-1045  B3 On the optical stability of high-resolution transmission electron microscopes
Andreas Thust, Jülich Research Centre (Germany)

1045-1115  TEA & COFFEE BREAK

1115-1150  B4 Advances in instrumentation and software for electron microscopy
Ondrej Krivanek, Nion Company – Kirkland (US)

1150-1225  B5 Measurement of chromatic aberration in transmission electron microscopes with imaging filters
Thomas Walther, University of Sheffield (UK)

1225-1300  B6 Toward quantitative analysis of atomic-resolution X-ray maps in an aberration-corrected scanning transmission electron microscope with a large solid-angle detector
Masashi Watanabe, Lehigh University (US)

1300-1430  LUNCH in the “Kruidentuin” restaurant

SESSION C  NOVEL TECHNIQUES AND ADVANCED METHODS
Chair: Knut Urban

1430-1505  C1 Exploring aberration corrected electron microscopy imaging for oxide/semiconductor heterostructures
Dave Smith, Arizona State University (US)

1505-1540 C2 Properties of two-dimensional materials obtained from experiments in a low-voltage aberration-corrected TEM
Ute Kaiser, University of Ulm (Germany)

1540-1615 C3 Imaging functional groups in graphene oxide at atomic resolution
Chris Boothroyd, Jülich Research Centre (Germany)

1615-1645 TEA & COFFEE BREAK

1645-1720 C4 From Stobbs factor to single particle Cryo-EM
Dirk Van Dyck, University of Antwerp (Belgium)

1720-1755 C5 Quantitative evaluation of temporal partial coherence using 3D Fourier transform of through-focus TEM images
Kazuo Ishizuka, HREM Research Inc – Higashimatsuyama (Japan)

1755-1830 C6 The multi-signal strategy in a STEM to map the optical response of individual nanoparticles
Christian Colliex, Université Paris-Sud (French Republic)

1830-2000 DINNER in the “Kruidentuin” restaurant

2000-2130 POSTER SESSION B in “Vaalsbroekerhof”

FRIDAY 11 OCTOBER 2013

SESSION D ELECTRON HOLOGRAPHY
Chair: John Rodenburg

0900-0935 D1 Electron holography in solids: problems and progress
Hannes Lichtle, University of Dresden (Germany)

0935-1010 D2 Finite element simulations of semiconductor dopant potentials for electron holography
Rafal Dunin-Borkowski, Jülich Research Centre (Germany)

1010-1045 D3 Electron holography of nanoscale electrostatic and magnetic fields
Molly McCartney, Arizona State University (US)

1045-1115 TEA & COFFEE BREAK
### SESSION E  PHASE RETRIEVAL TECHNIQUES AND DYNAMIC PHENOMENA

**Chair:** Dirk Van Dyck

<table>
<thead>
<tr>
<th>Time</th>
<th>Talk</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1115-1150</td>
<td>Forty years of complex wave determination</td>
<td>Owen Saxton</td>
<td>University of Cambridge (UK)</td>
</tr>
<tr>
<td>1150-1225</td>
<td>Legacies of the Gerchberg Saxton Algorithm</td>
<td>Michael Fiddy</td>
<td>University of North Carolina at Charlotte (US)</td>
</tr>
<tr>
<td>1225-1300</td>
<td>XFELS vs EELS for time-resolved dynamics</td>
<td>John Spence</td>
<td>Arizona State University (US)</td>
</tr>
<tr>
<td>1300-1430</td>
<td>LUNCH in the “Kamers” on the first and second floor of the Castle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430-1505</td>
<td>Quantitative transmission electron microscopy in liquids</td>
<td>Frances Ross</td>
<td>IBM T J Watson Research Centre (US)</td>
</tr>
<tr>
<td>1505-1540</td>
<td>In-situ electron holography for the dynamic study of local fields</td>
<td>Martin Hÿtch</td>
<td>CEMES – Toulouse (French Republic)</td>
</tr>
<tr>
<td>1540-1615</td>
<td>Quantitative electron microscopy of carbon based materials</td>
<td>Angus Kirkland</td>
<td>University of Oxford (UK)</td>
</tr>
<tr>
<td>1615-1645</td>
<td>TEA &amp; COFFEE BREAK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SESSION F  SOLID STATE AND SOFT MATTER APPLICATIONS

**Chair:** Christian Colliex

<table>
<thead>
<tr>
<th>Time</th>
<th>Talk</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1645-1720</td>
<td>Quantitative HRTEM of oxides</td>
<td>Chunlin Jia</td>
<td>Jülich Research Centre (Germany)</td>
</tr>
<tr>
<td>1720-1755</td>
<td>Profile imaging revisited: the surface of strontium titanate nanocuboids</td>
<td>Laurie Marks</td>
<td>Northwestern University (US)</td>
</tr>
<tr>
<td>1755-1830</td>
<td>Nanoswitches – TEM studies of resistive switching phenomena in chalcogenide materials</td>
<td>Joachim Mayer</td>
<td>RWTH Aachen University (Germany)</td>
</tr>
<tr>
<td>1830-1915</td>
<td>BREAK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1915-2000</td>
<td>WINE RECEPTION in the “Binnenplaats” in front of the Castle or in the “Kelders” of the Castle dependent on weather conditions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONFERENCE DINNER in the “Kamers” on the first and second floor of the Castle

SATURDAY 12 OCTOBER 2013

SESSION F  SOLID STATE AND SOFT MATTER APPLICATIONS (CONTINUED)
Chair: Archie Howie

0900-0935  F4  Electron-cryomicroscopy: from molecules to cells
           Wolfgang Baumeister, Max Planck Institute of Biochemistry (Germany)

0935-1010  F5  HREM analysis of graphite-encapsulated metallic nanoparticles for possible medical applications, and recent aberration-corrected ETEM research
           Robert Sinclair, Stanford University (US)

1010-1045  F6  Nature of the interfaces between the constituent phases in the high entropy alloy CoCrCuFeNiAl
           Hamish Fraser, Ohio State University (US)

1045-1115  TEA & COFFEE BREAK

1115-1150  F7  Transmission electron microscopy for high-efficiency solar cells
           Wolfgang Jäger, University of Kiel (Germany)

1150-1225  F8  Charge density within a unit cell of GaN imaged with sub-Ångström by differential phase contrast microscopy
           Bert Freitag, FEI Company – Eindhoven (The Netherlands)

1225-1300  F9  Atomic resolution imaging of mechanisms of interface motion in gold bicrystals
           Ulrich Dahmen, Lawrence Berkeley National Laboratory (US)

1300-1310  Closing Remarks
           Rafał Dunin-Borkowski, Jülich Research Centre (Germany), and
           Hannes Lichte, Dresden University (Germany)

1310-1430  LUNCH in the “Kamers” on the first and second floor of the Castle

1430  DEPARTURE of buses from the Hotel to Aachen railway station and Düsseldorf airport.
POSTER PROGRAMME

WEDNESDAY 9 OCTOBER 2013

POSTER SESSION A

PA01  Aberration-corrected TEM imaging and ab inito modelling of nanoparticle surfaces
      Shery Ly Chang§ and Amanda S Barnard‡
      §Forschungszentrum Jülich (Germany), ‡Virtual Nanoscience Laboratory – Parkville (Australia)

PA02  Energy-filtered chromatic aberration corrected high-resolution TEM on the PICO instrument
      L Houben§, M Luysberg§, J Barthel‡, J Mayer‡ and RE Dunin-Borkowski§
      §Forschungszentrum Jülich GmbH (Germany), ‡RWTH Aachen University (Germany)

PA03  Elastic and inelastic scattering of relativistic electrons in oriented crystals
      Dieter Hinderks and Helmut Kohl
      Universität Münster (Germany)

PA04  Atomic scale composition mapping by means of aberration-corrected transmission electron microscopy
      M Korytov§, N Cherkashin§, T Schulz§, T Remmele† and M Albrecht‡
      §CEMES-CNRS Toulouse (France), †IKZ Berlin (Germany)

PA05  Aberration-free femtosecond electron pulse compression using an electrostatic spherical capacitor
      RM Tromp¹ and K Grzelakowski²

¹ Posters will be presented in the "Vaalsbroekerhof" on Wednesday 9 October and Thursday 10 October 2013 at 2000-2130 following the dinner.
PA06  Multisignal detection on S/TEM with simultaneous EDS/EELS acquisition with up to 1000 spectra/second
Daniela Sudfeld and Sorin Lazar
FEI Company – Eindhoven (The Netherlands)

PA07  Maximising the efficiency of inelastic electron scattering calculations by considerations of symmetry and entanglement
Christian Dwyer
Forschungszentrum Jülich GmbH (Germany)

PA08  DUAL-EEM: Aberration free energy selective simultaneous imaging and k-space projection
Krzysztof P Grzelakowski
OPTICON Nanotechnology – Wrocław (Poland)

PA09  Spin-polarised transmission electron microscope using a semiconductor photocathode
Masahiro Kuwahara, S Kusunoki, Y Nambo, K Saitoh, T Ujihara and N Tanaka
Nagoya University (Japan)

PA10  Electron diffractive imaging of atomic structures and electric fields of nano materials
J Yamasaki, S Morishita, K Ohta, H Sasaki and N Tanaka
Nagoya University (Japan), Furukawa Electric Co Ltd (Japan)

PA11  TEM holder for sample transfer under reaction conditions
Christian D Damsgaard, Henning W Zandbergen and Jakob B Wagner
§Technical University of Denmark (Denmark), †Delft University of Technology (The Netherlands)

PA12  EELS tomography: from spectrum images to spectrum volume
Lluís Yedra, Alberto Eljarrat, Josep Manel Rebled, Lluís López-Conesa, Sònia Estradé and Francesca Peiró
Universitat de Barcelona (Spain)

PA13  Improving the efficiency of electron holography by combined off-axis and inline holography
Cigdem Özsoy Keskinbora, Chris Boothroyd, Rafał Dunin-Borkowski, Peter A van Aken and Christoph T Koch
§Max Planck Institute for Intelligent Systems – Stuttgart (Germany), †Forschungszentrum Jülich GmbH (Germany), ‡Ulm University (Germany)
PA14 Application of aberration corrected transmission electron microscopes for nano dimensional metrology
GAIOLIANG DAI§, MARKUS HEIDELMANN*, CHRISTIAN KÜBEL†, LUDGER KOENDERS§, JENS FLUEGGE§, HARALD BOSSE§
§Physikalisch Technische Bundesanstalt – Braunschweig (Germany), †RWTH Aachen University (Germany), ‡Karlsruhe Institute of Technology (Germany)

PA15 Design of a dedicated environment for a high-performance electron microscope and first results
MAGNUS GARbrecht§, JUSTINAS PALISAITIS§†, JUN LU§, LARS HULTMAN§†, and PER O. Å. PERSson§
§Linköping University (Sweden), †now: RWTH Aachen University (Germany, ‡now: Swedish Foundation for Strategic Research – Stockholm (Sweden)

THURSDAY 10 OCTOBER 2013

POSTER SESSION B

PB01 3C-SiC/Si (001) epitaxial interface and stacking faults clarified by aberration-corrected transmission electron microscopy
J Yamasaki, S INAMOTO, Y Nomura, H Tamaki, A Ishida, K Akiyama†, Y Hirabayashi† and N Tanaka
Nagoya University (Japan), †Kanagawa Industrial Technology Center (Japan)

PB02 Production, propagation and interference of electron vortex beams
K SAitoH, Y Hasegawa, K HIRakawa, N TANAKA, S Tanimura† and M UCHida†
Nagoya University (Japan), Saitama Institute of Technology – Fukaya (Japan)

PB03 High-resolution imaging and spectroscopy of CoO octahedral nanoparticles
Zi-An Li§, Andras Kovacs†, Nerio Fontaiña-Troitiño†, Sara Liébana-Viñas§, Marina Spasova§, Verónica Salgueiriño†, Rafal E. Dunin-Borkowski† and Michael Farle§
§University Duisburg-Essen (Germany), †Research Centre Jülich (Germany), ‡Universidade de Vigo (Spain)

PB04 Atomic-resolution studies of inversion domain boundaries in In₂O₃–ZnO compounds
WENTAO YU§, LOTHAR HOUBEN† and WERNER MADER§
PB05 Electronically non-alloyed state of a statistical single atomic layer semiconductor alloy
Ph. Ebert§, S. Landrock§, Y. Jiang†, Kh. Wu§, Eg. Wang† and Re. Dunin-Borkowski§
§Forschungszentrum Jülich GmbH (Germany), †Beijing University (People's Republic of China), ‡Chinese Academy of Sciences (People's Republic of China)

PB06 Atomic structure of (110) anti-phase boundaries in GaP on Si(001)
Andreas Beyer§, Benedikt Haas§, Katharina Ines Gries§, Katharina Werner§, Martina Luysberg†, Wolfgang Stolz§ and Kerstin Volz§
§Philipps-University Marburg (Germany), †Jülich Research Centre (Germany)

PB07 Atomic structure of graded interfaces in InAs/GaAs nanowires
E. Johnson§, P. Krostrup§, Cb. Sørensen§, J. Nygård§, C. Ophus†, U. Dahmen†, J. Yamasaki† and N. Tanaka†
§University of Copenhagen (Denmark), †LBNL – Berkeley (USA), ‡Nagoya University (Japan)

PB08 Fluctuation electron microscopy of a bulk metallic glass
C. Gammer§, D. Beiteleschmidt§, S. Pauly§, D. Geist§, J. Eckert†, H. P. Karnthaler§ and C. Rentenberger§
§University of Vienna (Austria), †IFW Dresden (Germany)

PB09 TEM of nanocrystals embedded in amorphous Co$_3$Ti
D. Geist, C. Gammer, C. Ebner, C. Rentenberger and H. P. Karnthaler
University of Vienna (Austria)

PB10 Quantification of oxygen vacancies induced by Gd-doping on individual CeO$_2$ nanocrystals
Dg. Stroppa§, C. J. Dalmaschio§, L. Houben§, J. Barthel§, L. M. Mon- torno†, E. R. Leite† and A. J. Ramirez§
§Forschungszentrum Jülich GmbH (Germany), †Brazilian Nanotechnology National Laboratory – Campinas (Brazil), ‡Federal University of São Carlos (Brazil)

PB11 Microstructural characterisation of bismuth selenide topological-insulator thin films
Nv. Tarakina§, S. Schreyeck§, M. Luysberg†, C. Schumacher§, C. Gould§, G. Karczewski§, K. Brunner§, H. Buemann§ and L. Wollenkamp§
Crystal structure of novel compounds solved using 3D intensity data obtained by electron diffraction tomography

WILDER CARRILLO-CABRERA
Max-Planck-Institut für Chemische Physik fester Stoffe – Dresden (Germany)

Graphoepitaxial Josephson junctions and SQUIDs

MICHAEL I. FALEY, DORIS MEERTENS, ULRICH POPPE AND RAFAŁ E. DUNIN-BORKOWSKI
Jülich Research Centre (Germany)

Aberration-corrected probe determination of structure and chemistry of long-persistence strontium aluminate phosphors

CLEVA W. OW-YANG§, MIRAN ČEH†, GULIZ İNAN AKMEHMET§, AND SAŠO ŠTURM†
§Sabanci University – Tuzla-Istanbul (Turkey), †Jožef Štefan Institute – Ljubljana (Slovenia)

Atomic structure and dynamics of supported, size-selected metal clusters – and prospects for super-abundant production

RICHARD E. PALMER
University of Birmingham (UK)

High solid-angle TEM-EDXS for the analysis of beam-sensitive glass-ceramics

CHRISTIAN PATZIG, ARACELI DE PABLOS-MARTIN, AND THOMAS HöCHE
Fraunhofer Institute for Mechanics of Materials IWM – Halle (Germany)

Applying XANES and ELNES for coordination fingerprinting

THOMAS HöCHE§, CHRISTIAN PATZIG§, YONGFENG Hu†, AND HIDEKAZU IKENO‡
§Fraunhofer Institute for Mechanics of Materials IWM – Halle (Germany), †University of Saskatchewan (Canada), ‡Osaka Prefecture University (Japan)