

22nd Annual Workshop on Secondary Ion Mass Spectrometry

Working Copy 5/10/2010

Revised in green 5/11/10

Organizing Committee:

Greg Gillen, NIST - Chairman
Richard Lareau, DHS, Science & Technology – Chairman

Steven Hues, Micron Technology - Chairman

Monday - May 17, 2010

8:00AM – 4:00PM Vendor Exhibitor Setup

12:00PM – 6:00PM Conference registration

6:00 – 10:00 PM Opening Reception

Tuesday - May 18, 2010

Tutorial Program

8:45 – 9:00 AM Welcome and Introductions

9:00 – 11:00 AM Special Tutorials on Biological SIMS

Biological SIMS Sample Prep, Peter Sjovall, Department of Applied Physics, Chalmers University of Technology, Sweden

Biological SIMS Current Capabilities, Dave Castner, University of Washington

Biological SIMS New Directions, Christopher Szakal, National Institute of Standards and Technology

11:00 – 11:30 AM Break

11:30 – 12:30 PM Application of SIMS to Nuclear Forensics,
Albert Fahey, National Institute of Standards and Technology

12:30 – 1:30 PM Lunch

1:30 – 2:30 PM Latest Developments in Spatially Resolved Atmospheric Pressure
Mass Spectrometry, R.G. Cooks, Purdue University.

2:30 – 3:30 PM Fundamentals and Applications of Atom Probe, Imago Scientific

3:30 – 4:00 PM Break

4:00 – 5:00 PM Overview and Applications of FIB-SIMS, Fred Stevie, North
Carolina State University

AFTER 5:00 Vendor User Meetings- Cameca, Phi, Ion TOF

Wednesday – May 19, 2010

Technical Program

7:30 - 8:00 AM Continental Breakfast

[Cluster SIMS/Organic and Polymeric Depth Profiling](#)

8:00 - 8:30 AM Special Topic, Radiation Chemistry of Polymers – Relevance to Cluster SIMS, Dr. Mohamad Al'Sheikly, University of Maryland

8:30 - 8:50 AM Depth profile characteristics of organic materials with large Ar cluster ion beams , S. Ninomiya, Kyoto University

8:50 - 9:10 AM Shallow and damage-less etching of organic materials by electrospray droplet impact

K. Hiraoka^{a,*}, Y. Iijima^b, Y. Sakai^a

9:10- 9:30 AM Molecular Depth Profiling of Irganox Delta Layers with Cluster SIMS and Wedges, Dan Mao, Penn State

9:30 – 9:50 AM Depth Profiling of Organic Materials Under Optimized Ion Beam Conditions, Derk Rading, Ion Tof, Muenster, Germany

9:50 - 10:20 AM Break

Cluster/Organic SIMS Continued

10:20- 10:40 AM Low Energy Ion Depth Profiling of Molecular Solids, Laurent Houssiau, University of Namur, Belgium

10:40 - 11:00 AM Organic Depth Profiling of a Nanostructured Delta Layer Reference Material – A Comparison of Ar₅₀₀₋₁₀₀₀⁺ and C₆₀ⁿ⁺, Joanna Lee, NPL

11:00 - 11:20 AM A few Aspects of Molecular Depth Profiling, Andreas Wucher

11:20- 11:50 AM Fundamental Studies of Molecular Depth Profiling Using Langmuir-Blodgett Delta Layers

Caiyan Lu^{a,*}, Andreas Wucher^b, Nicholas Winograd^a

11:50-12:10 AM Towards the Mechanism of Matrix Enhanced SIMS Using Room Temperature Ionic Liquids

Jennifer J.D. Fitzgerald, Paul Kunnath, Alice T. Lin, Amy V. Walker^{a*}, University of Texas, Dallas

12:10 - 1:30 PM Lunch

Special Topical Session on FIB-SIMS and Related Topics

1:30 -1:50 PM Advances in 3D TOF-SIMS Imaging with FIB Sectioning
Greg Fisher, Phi

1:50- 2:10 PM A High Brightness Plasma Ion Source for Nano-Probe SIMS and FIB Applications N. S. Smith^{a,*}, P. P. Tesch^a, N. P. Martin^a and R. W. Boswell^{a,b} Oregon Physics LLC, Hillsboro, Oregon, USA.

2:10 - 2:30 PM Dynamic SIMS Analysis using Ga⁺ Focused Ion Beam, Yura Guryanov, Corning

2:30- 3:00 PM Break

SIMS ASTM Committee Meeting

3:00 - 4:00 PM ASTM Meeting/Workshop - (Chair: Christine Mahoney)

Invited Speaker VAMAS Interlaboratory Study on SIMS –(1) Linearity of the Intensity Scale and (2) Organic Depth Profiling
National Physical Laboratory, United Kingdom

Joanna Lee,

5:00 PM Workshop Outing – Historic Sailing Ship Cruise/Dinner on the River

Thursday – May 20, 2010

Technical Program

7:30 - 8:30 AM **Continental Breakfast**

[Fundamentals/Ionization Effects in SIMS](#)

8:30- 8:50 AM Useful Yield Measurements for Cluster Bombardment SIMS, Greg Gillen, NIST .

8:50- 9:10 AM Ionic Liquid Matrix Enhanced Secondary Ion Mass Spectrometry, Amy Walker, University of Texas, Dallas

9:10- 9:30 AM Method for Improved Secondary Ion Yields in Cluster Secondary Ion Mass Spectrometry, Tim Brewer, NIST

9:30 – 9:50 AM Applications of Ion Soft Landing in SIMS Ion Yield Enhancement and in Preparation of Organometallic Catalysts on Inert Surfaces, R. G. Cooks, Purdue University

9:50- 10:10 AM Angular Distribution of Molecules Sputtered by C₆₀ Primary Ions
D.A. Brenes^{a*}, Z. Postawa^b, B.J. Garrison^a, N. Winograd^a, Penn
State

10:10 – 10:30 AM Break

10:30-10:50 AM Molecular Depth Profiling: Salt Suppression and Temperature
Effects, Alan Piwowar, University of Manchester

10:50-11:10 AM Measurement of Cluster Size Dependence of Sputtering Yield
Using Size-Selected Ar Cluster Ion Beams Jiro Matsuo, Kyoto
University

[Depth Profiling](#)

11:10-11:30 AM Quantification of H, C, N, O in Niobium and Niobium Oxide for SRF
Cavities, Prateek Maheshwari

11:30 - 11:50 AM Trace Diffusion Study by the Combined Use of TOF-SIMS and
LEAP, T. Nakagawa, National Institute for Materials Science,
Tsukuba, Japan

11:50- 12:10 AM H and D Depth Profiling, Zihua Zhu, PNL National laboratory

12:10 - 12:30 PM Quantification of in Depth Profiling SiGe Alloys Based Structures, Alexander Merkulov, Cameca

12:30 - 1:20 PM Lunch

SIMS Applications in Industry

1:0 - 1:40 PM Analysis of Defects on Industrial Samples, Michaeleen Pacholski, Dow Chemical

1:40-2:00 PM ToF-SIMS Analysis in an Industrial Research and Development Laboratory: the Pro's and Con's, Vincent S. Smentkowski , General Electric Global Research Center

SIMS of Geological Materials

2:00- 2:20 PM Depth Profiling of Solar Wind Collectors, Igor V. Argonne National Lab

2:20- 2:40 PM Automated Particle Measurements in the IMS 1280 Large Radius SIMS Instrument, David Simons, NIST

2:40 – 3:10 PM Break

Workshop Sponsor Session (Chair: Fred Stevie)

3:10- 3:30 PM Vendor Technical Presentation Physical Electronics

3:30- 3:50 PM Vendor Technical Presentation Cameca Instruments

3:50- 4:10 PM Vendor Technical Presentation ION TOF

Poster Session

4:00 – 6:00 PM [Poster Viewing](#)

6:00 – 7:00 PM [Social Mixer](#)

7:00 PM [Vendor Dinner](#)

Friday – May 21, 2010

Technical Program

7:30 - 8:00 AM **Continental Breakfast**

Cluster SIMS of Organic Materials

8:00-8:20 AM TOF-SIMS of High Explosive Mixtures of C4 – Christine Mahoney,
NIST

8:20-8:40 AM SIMS and Maldi Imaging of Glycerophospholipid, M.K. Passarelli and
N. Winograd, Penn State

8:40-9:00 AM Surface Mapping with Cluster SIMS, Emile Sweikert, Texas A&M
University

9:00 – 9:20 AM Fluence Effects in C60 Bombardment of Silicon, K. Krantzman

9:20- 9:50 AM “Wet SIMS” with Swift Heavy Ions for Biological Material Analysis
Jiro Matsuo^{a,b*}, Yoshinobu Wakamatsu^c, Hideaki Yamada^c, Satoshi
Ninomiya^{a,b}, Kyoto University,

9:50-10:10 AM Jennifer Appawu, Gardella Group, Organic Imaging

10:10 – 10:30 AM Break

Open Session

10:30 - 10:50 AM Quantitative Dual Beam TOF-SIMS Depth Profiling of C-60 Doped PMMA Thin Films, J-P. Barnes, CEA, Grance.

10:50 - 11:10 AM Selective electroless deposition of nickel on functionalized alkanethiolate self assembled monolayers

Zhiwei Shi, Amy. Walker*, UT Dallas

11:10 – 11:30 AM Method Development and Validation of Comparative Finished Fiber Analysis Using Nano-Sampling Cryomicrotomy and ToF-SIMS".Elaine Zhou, NCSU

11:30 – 11:50 AM Improvement of the F and Cl detection limits in SIMS analysis of Si and SiO₂ materials. A.L. Pivovarov* and G.M. Guryanov, Corning

11:50 AM **Closing**

Posters:

1. Atmospheric Desorption and Detection of Organic Compounds by Atmospheric Pressure Glow Discharge Mass Spectrometry (APGD), Tim Brewer, NIST
2. Fundamental SIMS Metrology Development and Considerations for Molecular Depth Profiling of Photoresist Materials on Silicon, Christopher Szakal, NIST
3. Large Area Cross Sectional Microstructural Characterization of ToF-SIMS Depth Profile Craters V.S. Smentkowski* and D. Ellis
General Electric Global Research Center
4. Multiplexed Single Molecule Detection using Chemical Barcodes -TOF-SIMS as a Tool for Biomolecular Diagnostics
Anders Gunnarsson^{a,b}, Fredrik Höök^a and Peter Sjövall^{a,b,*}
5. Phospholipids in single cells studied by imaging mass spectrometry
Ingela Lanekoff^a, Michael Kurczyk^b, Peter Sjövall^{c,*} and Andrew Ewing^a
6. TOF-SIMS analysis of steranes in single oil-bearing fluid inclusions as a way of studying evolution of eukaryotes
S. Siljeström^{a,b}, J. Lausmaa^b, P. Sjövall^{b,*}, C. Broman^a, V. Thiel^c and T. Hode^d
7. New applications in 3D Atom Probe
F. Horr éard*, I. Martin*, R. Benbalagh*, L. Renaud *,
D. Lawrence**, C. Jones**, D. J. Larson** and T. F. Kelly**
*CAMECA
8. Recent Instrumental Development on the NanoSIMS ion microprobe
F. Horr éard, F. Hillion CAMECA France, 29 Qui de Gr ésilions, 622 Gennevilliers Cedex, France.

9. Surface Characterization of Water Filtration Membranes by SIMS and XPS, Jing Jin, Dow Chemical Company, Midland, MI
10. Identification of the ion chemistry coupled to an ion mobility spectrometer based explosive trace detector using a mass spectrometer
Joseph Kozole, Global Systems Technologies, Inc.
11. ToF SIMS Surface Analysis of Post Exposure Ru- MLM EUV Mirrors,
Albert Fahey, NIST
12. Ambient Ion Soft Landing and Surface Patterning
Abraham K. Badu-Tawiah, Chunping Wu and R. Graham Cooks
13. In situ SIMS Analysis and Surface Enhanced Raman Spectroscopy of Soft-Landed Ions/Molecules
Jobin Cyriac, Guangtao Li and R Graham Cooks

Monday, May 18, 2010

ABSTRACTS

May 18, 2010

Peter Sjoval

Biological SIMS Sample Prep

May 18, 2010

Dave Castner

Biological SIMS Current Capabilities

May 18, 2010

Christopher Szakal

Biological SIMS New Directions

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Albert Fahey

Application of SIMS to Nuclear Forensics

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Latest Developments in Spatially Resolved Atmospheric Pressure Mass Spectrometry

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Fundamentals and Applications of Atom Probe

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Fred Stevie

Overview and Applications of FIB-SIMS

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Special Topic, Radiation Chemistry of Polymers – Relevance to Cluster SIMS

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Depth profile characteristics of organic materials
with large Ar cluster ion beams

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Depth Profiling of Organic Materials Under Optimized Ion Beam Conditions

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Low Energy Ion Depth Profiling of Molecular Solids

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Organic Depth Profiling of a Nanostructured Delta Layer Reference Material – A
Comparison of $\text{Ar}_{500-1000}^+$ and C_{60}^{n+} .

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A few Aspects of Molecular Depth Profiling

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Fundamental Studies of Molecular Depth Profiling Using Langmuir-Blodgett Delta Layers

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Towards the Mechanism of Matrix Enhanced SIMS Using Room Temperature Ionic Liquids

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A High Brightness Plasma Ion Source for Nano-Probe SIMS and FIB Applications

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Dynamic SIMS Analysis using Ga⁺ Focused Ion Beam

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Angular Distribution of Molecules Sputtered by C₆₀ Primary Ions

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Molecular Depth Profiling: Salt Suppression and Temperature Effects

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Measurement of Cluster Size Dependence of Sputtering Yield Using Size-Selected Ar Cluster Ion Beams

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Prateek Maheshwari

Quantification of H, C, N, O in Niobium and Niobium Oxide for SRF Cavities

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T. Nakagawa

Trace Diffusion Study by the Combined Use of TOF-SIMS and LEAP

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Zihua Zhu

H and D Depth Profiling

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Alexander Merkulov

Quantification of in Depth Profiling SiGe Alloys Based Structures

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Analysis of Defects on Industrial Samples

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Vincent S. Smentkowski

ToF-SIMS Analysis in an Industrial Research and Development Laboratory: the Pro's
and Con's

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Igor V. Veryovkin

Depth Profiling of Solar Wind Collectors

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David Simons

Automated Particle Measurements in the IMS 1280 Large Radius SIMS Instrument

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TOF-SIMS of High Explosive Mixtures of C4

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Brett Yatzor

Organic Imaging

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Quantitative Dual Beam TOF-SIMS Depth Profiling of C-60 Doped PMMA Thin Films

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Selective electroless deposition of nickel on functionalized alkanethiolate self assembled monolayers

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Method Development and Validation of Comparative Finished Fiber Analysis Using
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Improvement of the F and Cl detection limits in SIMS analysis of Si and SiO₂ materials

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2. **Fundamental SIMS Metrology Development and Considerations for Molecular Depth Profiling of Photoresist Materials on Silicon**, Christopher Szakal, NIST

3. Large Area Cross Sectional Microstructural Characterization of

ToF-SIMS Depth Profile Craters, V.S. Smentkowski* and D. Ellis

General Electric Global Research Center

4. **Multiplexed Single Molecule Detection using Chemical Barcodes
-TOF-SIMS as a Tool for Biomolecular Diagnostics,**
Anders Gunnarsson^{a,b}, Fredrik Höök^a and Peter Sjövall^{a,b,*}

5. Phospholipids in single cells studied by imaging mass spectrometry,

Ingela Lanekoff^a, Michael Kurczy^b, Peter Sjövall^{c,*} and Andrew Ewing^a

**6. TOF-SIMS analysis of steranes in single oil-bearing fluid inclusions
as a way of studying evolution of eukaryotes,**

S. Siljeström^{a,b}, J. Lausmaa^b, P. Sjövall^{b,*}, C. Broman^a, V. Thiel^c and T. Hode^d

7. **Improvement of the F and Cl detection limits in SIMS analysis of Si and SiO₂ materials**, A.L. Pivovarov* and G.M. Guryanov, Corning

8. New applications in 3D Atom Probe,

F. Horr ard*, I. Martin*, R. Benbalagh*, L. Renaud *,
D. Lawrence**, C. Jones**, D. J. Larson** and T. F. Kelly**

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9. Recent Instrumental Development on the NanoSIMS ion microprobe,

F. Horréard, F. Hillion CAMECA France, 29 Qui de Grésillons, 622 Gennevilliers Cedex, France.

- 10. Surface Characterization of Water Filtration Membranes by SIMS and XPS, Jing Jin, Dow Chemical Company, Midland, MI**

11. **Identification of the ion chemistry coupled to an ion mobility spectrometer based explosive trace detector using a mass spectrometer,**
Joseph Kozole, Global Systems Technologies, Inc.

12. ToF SIMS Surface Analysis of Post Exposure Ru- MLM EUV Mirrors,

Albert Fahey, NIST

13. Ambient Ion Soft Landing and Surface Patterning,

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14. **In situ SIMS Analysis and Surface Enhanced Raman Spectroscopy of Soft-Landed Ions/Molecules, Jobin Cyriac, Guangtao Li and R Graham Cooks**

