

20th Annual Workshop on Secondary Ion Mass Spectrometry

Organizing Committee:

Steven Hues, Micron Technology - Chairman

Greg Gillen, NIST - Chairman

Richard Lareau, DHS, Science & Technology - Chairman

Tuesday – May 15, 2007

Tutorial Program

- 9:00 – 10:00 AM** Characterization of Biomaterials by TOF-SIMS, Anna Belu (Medtronics)
- 10:00 – 10:30 AM** **Break**
- 10:30 – 11:30 AM** Molecular Dynamics Simulations of Cluster Bombardment, Barbara Garrison (Penn State University)
- 11:30 – 1:00 PM** **Lunch**
- 1:00 – 2:00 PM** Ionization Mechanisms in SIMS, Peter Williams (Arizona State University)
- 2:00 – 3:00 PM** Kitchen Sink SIMS, Scott Bryan (Physical Electronics)
- 3:00 – 3:30 PM** **Break**
- 3:30 – 4:30 PM** Multivariate Data Analysis for TOF-SIMS, Barry Wise (Eigenvector Research)
- 6:00-10:00 PM** **Opening reception and registration**

Wednesday – May 16, 2007

Technical Program

7:00 - 8:00 AM Continental Breakfast

8:00 - 8:10 AM Welcome and Introductions

Plenary Session Personal Perspectives on the History of SIMS (Chair: Dave Simons)

8:10 - 8:40 AM Dynamic SIMS using a Magnetic Sector Instrumentation: A Brief History with Personal Reminiscences, Charles A. Evans, Jr. (Evans Analytical Group)

8:40 - 9:10 AM Quadrupole-based Dynamic SIMS: A Brief History with Personal Reminiscences, Charles Magee (Evans Analytical Group)

9:10 - 9:40 AM Static SIMS with Quads and TOFs, Nick Winograd (Penn State University)

9:40 - 10:10 AM Ionization/Sputtering Theories and Quantitation, Pete Williams (Arizona State University)

10:10 – 10:20 AM Morning Break

Biological SIMS (Chair: Christine Mahoney)

10:20 - 10:40 AM Chemical Imaging of Drug Eluting Coatings: Surface Analysis and Confocal Microscopy, Anna Belu (Medtronic)

10:40 – 11:00 AM Quantitative MIMS Tomography, Claude Lechene (Harvard University)

11:00 – 11:20 AM TOF SIMS for Differentiation of Cancer Cells, Kuang Jen Wu (Lawrence Livermore National Laboratory)

11:20 - 11:40 AM Applying Imaging ToF-SIMS and PCA in Differentiation of Mouse Embryo Tissue Types, Ligang Wu (UC Davis)

11:40 – 12:00 PM Freeze-Etching Water Matrix Enhanced Sample Preparation for ToF-SIMS Imaging of Single Cells, P. Piehowski (Penn State University)

12:00 – 1:00 PM Lunch

Cluster SIMS (Chair: Chris Szakal)

1:00- 1:20 PM Reaction Dynamics Following keV Cluster Bombardment, Kathleen E. Ryan (Penn State University)

1:20- 1:40 PM ToF-SIMS 3D Biomolecular Imaging using Buckminsterfullerene (C₆₀) Primary Ions, John Fletcher (University of Manchester)

1:40 – 2:00 PM SIMS with Au₄₀₀ and C₆₀ as Projectiles, Emile Schweikert (Texas A&M University)

2:00 – 2:20 PM Cluster SIMS with a Hybrid Quadrupole Time-of-Flight Mass Spectrometer, Tony Carado (Penn State University)

2:20 – 2:40 PM Break

Chemometrics (Chair: Steve Hues)

2:40 – 3:00 PM Overview of the Current State of Multivariate Data Reduction, Bonnie Tyler (University of Utah)

3:00 – 3:20 PM Results of TOF-SIMS Chemometrics Round Robin, Albert Schnieders, (IonTOF)

3:20 – 3:40 PM Characterization of Adhesive Materials using Multivariate Analysis, Michaeleen Pacholski (Rohm and Haas)

New Directions in Desorption Ionization (Chair: Richard Lareau)

3:40 – 4:00 PM Ambient Mass Spectrometry: Applications of Desorption Electrospray Ionization in Forensics, Chemistry and Biology, Ismael Cotte-Rodríguez (Purdue University)

4:00 - 4:20 PM The Beach, Some Heat, and Direct Ionization in Real Time, B. Musselman (IonSense)

4:20 - 4:40 PM Fundamental Analysis of Particle Ejection from Droplet Impact, Christin E. Palombo (Penn State University)

Instrument Users Meetings

4:40 – 6:00 PM Cameca, Ion TOF, PHI

6:00 - 7:00 PM Social Mixer/Poster Viewing

Vendor Dinner

7:00 - 10:00 PM Vendor Dinner

Thursday – May 17, 2007

Technical Program

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

Semiconductors (Chair: Joe Bennett)

8:00 - 8:20 AM Quantification of P and As implants in SiGe and Ge, Joe Bennett (International SEMATECH)

8:20 - 8:40 AM TOF-SIMS Analysis of Low K Interlevel Dielectric Materials for Semiconductor Back End of Line Applications, Steve Molis (IBM)

8:40 - 9:00 AM TOF-SIMS Characterization of Photoacid Redeposition in 193 nm Photoresists, Zhanping Zhang (Spansion Inc.)

9:00 – 9:20 AM Accurate SIMS Quantification near the Surface of Ultra Shallow Implants with Capping, Alex Merkulov (Cameca)

9:20 – 9:40 AM The Effects of Sample Aging and Unintended Cs Contamination on SIMS Dose Measurement of Low Dose Phosphorus Implants, C.R. Penley (North Carolina State University)

9:40 – 10:00 AM **Morning Break**

SIMS and FIB (Chair: Fred Stevie)

10:00 - 10:20 AM Gas Phase Ionization Source for FIB Applications, Lucille A. Giannuzzi (FEI)

10:20 - 10:40 AM Sample Preparation using Focused Ion Beams, Fred Stevie (NC State University)

Workshop Sponsor Session (Chair: Fred Stevie)

10:40-11:00 AM Physical Electronics

11:00-11:20 AM Cameca Instruments

11:20-11:40 AM ION TOF

11:40-12:00 PM Evans Analytical Group

12:00- 1:00 PM **Lunch**

1:00 – 1:30 PM ASTM Meeting- (Chair: Christine Mahoney)
Discussion on Research Directions for Semiconductor Metrology

Isotopic Measurements (Chair: Albert Fahey)

1:30 - 1:50 PM Spatially Resolved Isotopic Analysis of Martian Meteorites Using the IMS 1270, Albert Fahey (NIST)

1:50 - 2:10 PM In-situ Measurement of Oxygen Isotope Variation in Finely Laminated Carbonate Cements Using the CAMECA IMS-1280, J. G. Blank (University of Wisconsin)

2:10 - 2:30 PM High Precision and High Spatial Resolution Measurements of Si and S Isotopes using a Cameca 50L NanoSIMS, J. Wang (Carnegie Institution of Washington)

Insulators (Chair: Fred Stevie)

2:30 – 2:50 PM Impact of Ion Optics on Charge Neutralization, Georges Slodzian (University of Paris-Sud)

2:50 - 3:05 PM Insulator Analysis with a Magnetic Sector SIMS Instrument, Frank Zhu (IBM)

3:05 - 3:20 PM Analysis of Insulating Materials using a Quadrupole Mass Spectrometer, Charles Magee (Evans Analytical Group)

3:20 - 3:40 PM Analysis of Insulating Materials using a Time-of-Flight Mass Spectrometer, Anna Belu (Medtronics)

3:40 – 5:30 PM **Poster Session**

Characterization of Polymer Drug Delivery Systems with Cluster Secondary Ion Mass Spectrometry (SIMS), Christine Mahoney (NIST)

Use of Drop-on-Demand Inkjet Printing Technology to Produce Trace Level Contamination Standards for the Semiconductor Industry, Eric Windsor (NIST)

Cluster SIMS Analysis of Fullerenes and Organic Electronics Materials, Christopher Szakal (NIST)

High Precision Ion Implant Dosimetry using TOF-SIMS, Thomas Grehl (IonTOF)

Cluster SIMS Analysis of Nanometric Thin Layer Films, Zhen Li (Texas A&M University)

ToF-SIMS with Optical Profilometry Enhance our Understanding of the Reduction in Coefficient of Friction with Time in an Industrial Polymer Processing Environment, M. Kram (Innovia Films Ltd)

Examination of Supported Lipid Bilayers with Cluster Secondary Ion Mass Spectrometry, V. Pinnick (Texas A&M University)

SIMS for Relative Composition and Crystallinity Measurements of Photo-Thermo-Refractive Glass, M. Klimov (University of Central Florida)

Investigations of UV Cure on Porogen Removal in Ultra low-k Dielectrics by TOFSIMS, F. Fillot (CEA-LETI)

The Displacement and Thermal Spike Cluster Sputtering of Si (100) and 3C-SiC (100) Epi Films under Sub-keV Polyatomic SF₅⁺ Ion Bombardment, B. Atabaev (Arifov Institute of Electronics)

Imaging and PCA Analysis of DNA Microarrays, L. J. Gamble (University of Washington)

O₂⁺ versus Cs⁺ for Na Analysis in Silica Substrate using Quadrupole-Based SIMS, Y. Guryanov (Corning Incorporated)

New Methods for Metal Deposition on Alkanethiol Self Assembled Monolayers: Towards Molecular Electronic Circuitry, Peng Lu (Washington University in St. Louis)

Statistical Data Analysis and ToF-SIMS: Approaches and Applications for Addressing Problems in Industry, Brandon J. Kern (Dow Chemical)

Quantification of Nitrogen in Silicon and Silicon Germanium Photovoltaic Materials, R. Reedy (National Renewable Energy Laboratory)

On the Understanding of Ionization Processes during ToF-SIMS Depth Profiling by Co-Sputtering Cs and Xe, J. Brison (University of Namur)

UV Photooxidation and Photopatterning of Alkanethiolated Self-Assembled Monolayers on GaAs (001) Surface, Chuanzhen Zhou (Washington University in St. Louis)

GaN Surface Topography Development under Oxygen Bombardment and its Effect on Depth Resolution, Y. Guryanov (Corning Incorporated)

Measurement of Uranium Isotopic Composition with High Sensitivity and Specificity by Secondary Ion Mass Spectrometry, David Simons (NIST)

Tomographic Atom Probe potentials in Semiconductor and Nano-scale Materials, Francois Horr ard (Cameca Instruments)

6:30- 10:00 PM Workshop Banquet

Friday – May 18, 2007

Technical Program

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

Depth Profiling of Organic Materials (Chair: Greg Gillen)

8:00- 8:20 AM Update on the Current Status of Cluster Depth Profiling - Overview of Cluster SIMS Workshop, Greg Gillen (NIST)

8:20- 8:40 AM Temperature-Controlled Depth Profiling of Atactic, Isotactic, and Syndiotactic PMMA using an SF₅⁺ Polyatomic Ion Source, Christine Mahoney (NIST)

Open Session (Chair: Steve Hues)

8:40- 9:00 AM ToF-SIMS Analysis of Oxidation Profiles in Elastomers, J. Ohlhausen (Sandia National Laboratories)

9:00- 9:20 AM Protocols for 3-Dimensional Cluster SIMS Imaging, Nick Winograd (Penn State University)

9:20- 9:40 AM Imaging and Spectrometry of Differentially Charging Samples, Greg Fisher (Physical Electronics)

9:40 - 10:00 AM SIMS Analysis Usage for Pipe Line Tube Protection against Hydrogen Illness, A.M. Mirzoev (Bauman Moscow State Technical University)

10:00 – 10:20 AM **Morning Break**

10:20 – 10:40 AM Fundamental Studies on the Emission of Secondary Ions from Molecular Overlayers on Polyethylene Surfaces using Bismuth and C₆₀ Primary Ion Clusters, E. Niehuis (IonTOF)

10:40 - 11:00 AM Depth Profiling of Genesis Solar Wind Collectors with Laser Post-Ionization SNMS: First Results, E. Tripa (Argonne National Laboratory)

11:00 - 11:20 AM Detection of Explosives, Chemical Warfare Agents, and Drugs Using Single Particle Aerosol Mass Spectrometry, George R. Farquar (Lawrence Livermore National Laboratory)

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| 11:20 – 11:40 PM | Comparative Investigation of Nanoparticles by Cluster-SIMS, S. Rajagopalachary (Texas A&M University) |
| 11:40 – 12:00 PM | Closing Remarks |
| 12:00 PM | Close |