SIMS Europe 2014

NPL was out in force at the SIMS Europe conference. The NiCE –MSI team successfully delivered seven talks, a short course presentation on data processing, and two posters at the 9th European Workshop in Secondary Ion Mass Spectrometry in Münster, Germany.

Bonnie Tyler discussed the use of MVA techniques—PCA, PLS, MCR and MAF—for ToF-SIMS data processing in a short course talk entitled, "Navigating the Alphabet Soup of Multivariate Analyses: What, Why and How?."
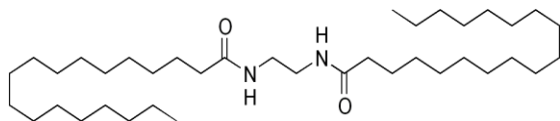
If you are interested in obtaining a copy of Bonnie's short course presentation, please contact Bonnie Tyler at bonnie.tyler at npl.co.uk

Bonnie Tyler also examined ion formation and the unimolecular decay pathways for a common polymeric additive in the talk, "Fragmentation and Ion Formation using Metastable Decay Peaks in Ethylene Bis-Stearamide"

Alex Shard explored the possibility of quantitation in ToF-SIMS with a novel mixed molecule reference material in his talk, "The Matrix Effects in Organic Secondary Ion Mass Spectrometry." For more information, check out Alex's recent article in the Int. J. Mass Spectrom.
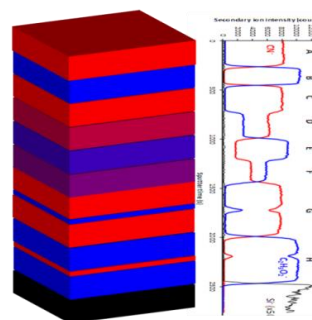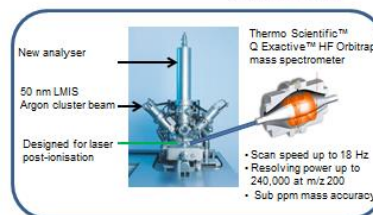
In his invited talk, "Metrology and advances for the analysis of organics by SIMS", **Ian Gilmore** took the audience on a London bus tour of SIMS, describing all the ways in which metrology has benefitted the technique.

The bus tour ended with the announcement of the 3D nanoSIMS project, an ambitious projects that will expand the capabilities of SIMS by incorporating Orbitrap technology into the ToF-SIMS platform.

3D nanoSIMS – major new project

NPL National Physical Laboratory | NiCE-MS National Centre of Excellence in Mass Spectrometry Imaging | gsk

iONTOF | Thermo SCIENTIFIC | The University of Nottingham UNITED KINGDOM · CHINA · MALAYSIA | UIC

New analyser
50 nm LMIS
Argon cluster beam
Designed for laser post-ionisation

Thermo Scientific™
Q Exactive™ HF Orbitrap mass spectrometer

· Scan speed up to 18 Hz
· Resolving power up to 240,000 at m/z 200
· Sub ppm mass accuracy

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Paulina Rakowska used the high lateral resolution of the Cameca NanoSIMS to image cell membrane active peptides in the talk, "Nanoscale Imaging of Peptide - Membrane Interactions." Correlative imaging with AFM reveals the dynamic process of pore formation by antimicrobial peptides in supported lipid bilayers. For more information, check out Paulina's recent article in PNAS.
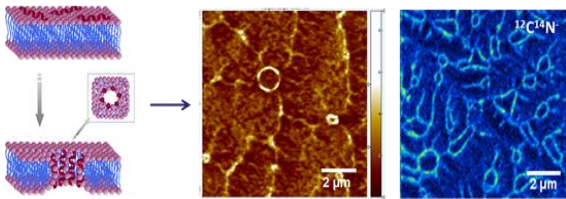

Rasmus Havelund gave important recommendations for the use of argon clusters in SIMS. In his talk, "Optimization of depth profiling modes for maximum signal intensity", he showed the effects of the argon cluster energy and size on the sputtering yield and secondary ion yield. Besides giving insights into the sputtering and ionisation behaviour, the recently published description provides useful guidance for SIMS users to select operating conditions.
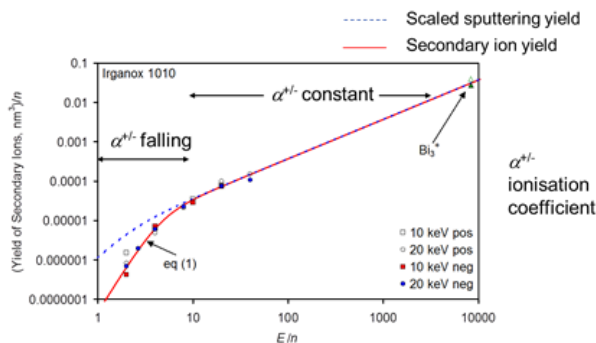
In a talk entitled "Argon Gas Cluster Ion Beam Sputter Removal of PMMA and Organic Residues from Graphene," **Barry Brennan** investigated the effect of using argon gas clusters to improve the quality of graphene produced by chemical vapour deposition. The graphene growth typically leaves a large amount of PMMA residual on the surface, which can impact on device performance and reliability. Low energy argon gas cluster sputtering combined with ToF-SIMS and Raman analysis showed this cleaning process to be effective at removing the PMMA residue without damaging the graphene layer.

Melissa K. Passarelli discussed the potential of ToF-SIMS as an analytical tool in the pharmaceutical industry in the talk, "3D Mass Spectrometry Imaging: Visualizing Pharmaceutical compounds on the single-cell level." Melissa also presented a poster on the use of ToF-SIMS to characterize MALDI matrix distributions on tissue for various application methods.
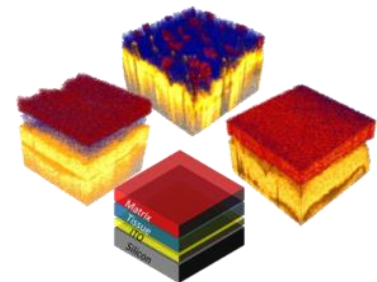
Collaborator **Carla Newman** from GSK/ the University of Nottingham examined the effects of the drug incubation on the two cell populations, adherent and suspended, in the poster, "Where is my drug? Finding pharmaceuticals in intercellular space using ToF-SIMS."