

Nova Park 2018

The NEW NexION 2000 ICP-MS – small in size, big on innovation

David Price PhD, ICP-MS Product Specialist



Breakthroughs Happen

Learning Outcomes

- Introduction
- The new NexION 1000 and 2000
- Application 1
- Application 2



Introduction – who is David Price?



Learning Outcomes

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New NexION – SMALL in size



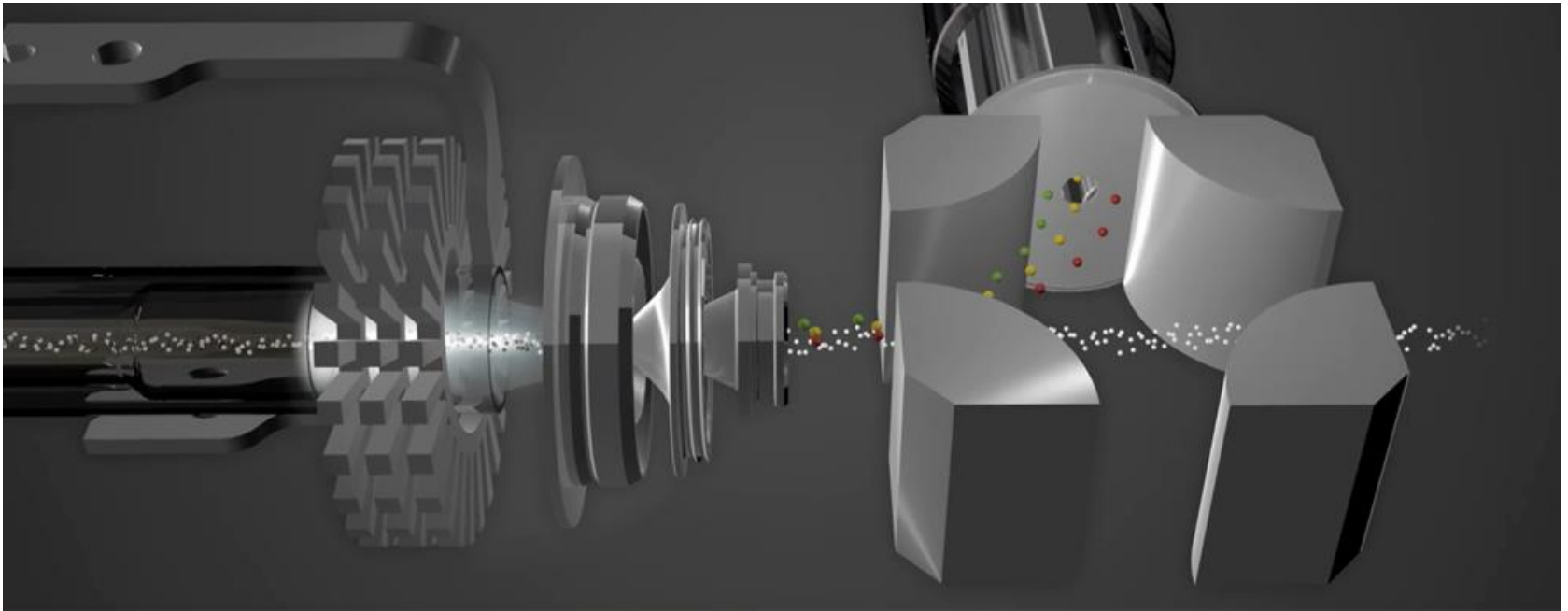
30% smaller
Just 81 cm wide



New NexION



New NexION – BIG on innovation



New NexION – BIG on innovation

Blue Base High Solids Solution

Orange Organic Solution

White Performance Semiconductor Non-HF Solution

Platinum HF-Resistant Semiconductor Solution

Black Productivity High Throughput Solution

Green Core Environmental Solution

See page 64 for more information



New NexION – BIG on innovation



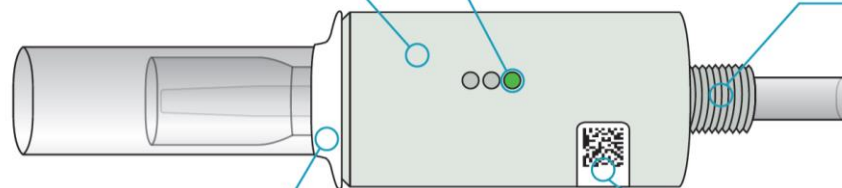
Material Options

- Quartz
- SiQ Ultra High Purity Quartz
- Cerulent Organics-Resistant Quartz

Color-coded Marking for Application Identification

- Indicates torch material and injector size

PVDF O-ring-free Torch Holder



Patented Design for Quick Gas Connections

- Clean installation
- No tightening gas lines to torch side-arms
- No torch o-rings
- Easy cleaning, all metal-free and o-ring-free
- Highly reproducible manufacturing and installation

PTFE Light Shield

2-D Barcode and Alphanumeric Marking for Complete Description

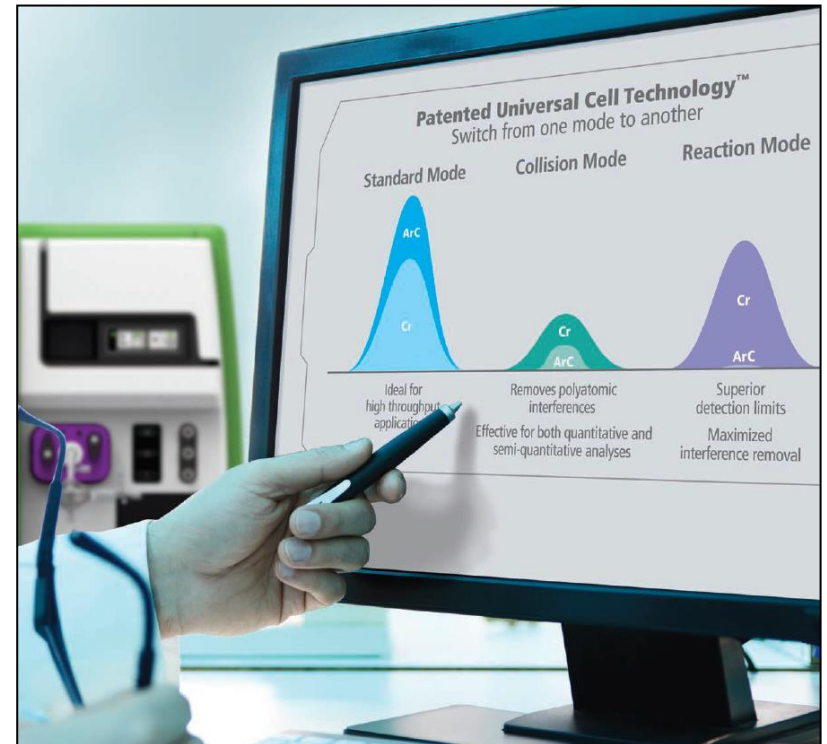
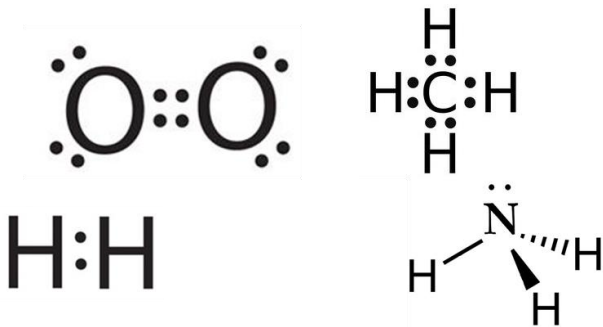


New NexION – BIG on innovation



New NexION – BIG on innovation

- NexION 1000 – one cell gas line
- NexION 2000 – three cell gas lines



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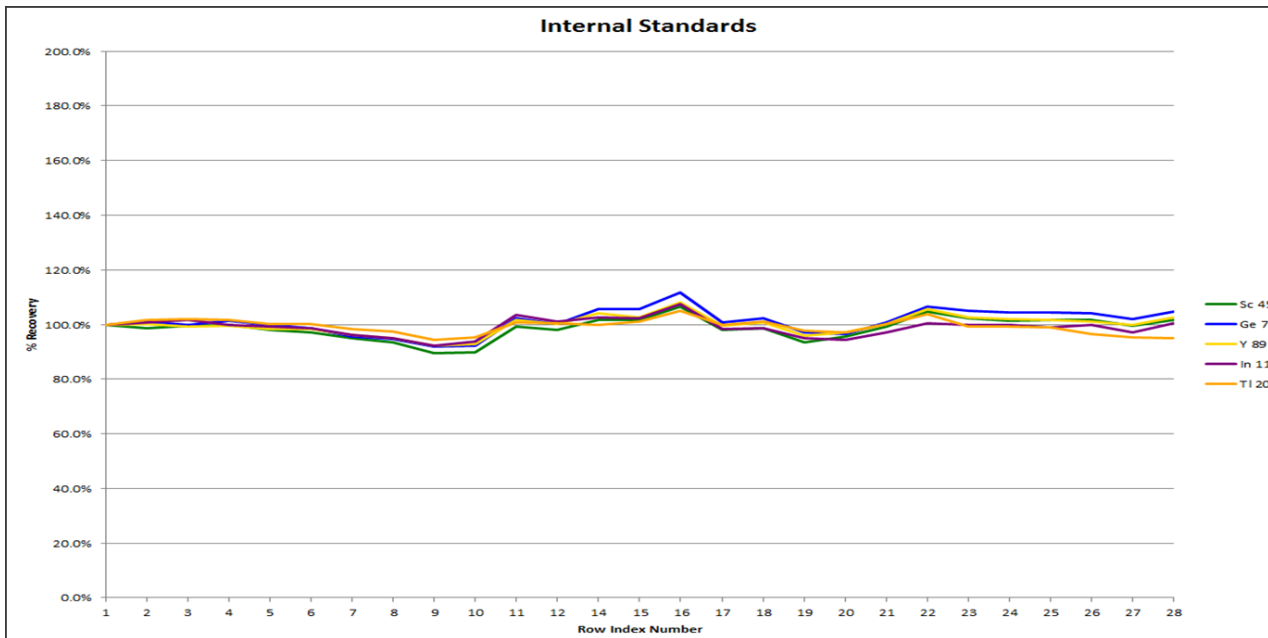
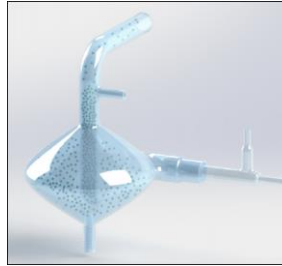
1. The challenge of high TDS

- Only so much energy in the argon plasma!
- What about trace elements in 0.4% Ni solutions?
- Trace elements in 1% Pb solutions?
- Trace elements in seawater (3.5% TDS)?
- Trace elements in 5% Cu solutions?




1. The challenge of high TDS

- The Solution



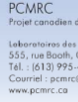
1. The challenge of high TDS

- Ni CRMs



CCRMP
Canadian Certified Reference Materials Project

CANMET Mining and Mineral Sciences Laboratories
555 Booth Street, Ottawa, Ontario, Canada K1A 0G1
Tel.: (613) 995-4738, Fax: (613) 943-0573
E-mail: ccrmp@mcas.gc.ca
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PCMRC
Projet canadien de matériaux de référence certifiés

Laboratoires des mines et sciences minérales de CANMET
555, rue Booth, Ottawa (Ontario) Canada K1A 0G1
Tel.: (613) 995-4738, Téléc.: (613) 943-0573
Courriel: pcmrc@mcas.gc.ca
www.pcmrc.ca

Certificate of Analysis

First issued: September 1992 Version: April 2008

PTM-1a

Nickel-Copper Sulphide Matte With Noble Metals


CERTIFIED VALUES

Constituent	Au µg / g	Cu wt %	Ni wt %	Pd µg / g	Pt µg / g
Mean	3.30	24.96	47.44	10.07	7.29
Within-lab SD	0.14	0.04	0.09	0.33	0.17
Between-lab SD	0.40	0.07	0.20	0.77	0.38
95% Confidence Limits	± 0.20	±0.04	±0.11	± 0.41	± 0.22


PROVISIONAL VALUES

Constituent	Ag µg/g	As wt %	Co wt %	Fe wt %	Ir µg/g	Pb wt %	Rh µg/g	Ru µg/g	S wt %
Mean	135	0.22	2.05	1.48	0.35	0.029	0.94	0.7	22.4
Within-lab SD	2.0	0.004	0.01	0.05	0.02	0.004	0.05	0.1	0.4
Between-lab SD	7.0	0.03	0.03	0.08	0.04	0.006	0.12	0.1	0.9
95% Confidence Interval	± 4	± 0.26	±0.02	± 0.10	± 0.09	± 0.010	± 0.09	± 0.4	±1.1

Source
The raw material for PTM-1a was donated by Falconbridge Limited from its operation in Sudbury, Ontario.



Natural Resources Canada Ressources naturelles Canada



1. The challenge of high TDS

- Ni CRMs

GEOSTATS PTY LTD
 Mining Industry Consultants
 Reference Material Manufacture and Sales

Certified Geochem Base Metal Reference Material Product Code

GBM398-4

Certified Control Values

Element	Grade	Standard Deviation	Num of Analyses	Confidence Interval
Nickel (ppm)	4071	187	104	+/- 36.5
Copper (ppm)	3891	195	147	+/- 31.9
Zinc (ppm)	5117	229	127	+/- 40.4
Lead (ppm)	11714	776	122	+/- 139.7
Arsenic (ppm)	12	9	72	+/- 2.1
Cobalt (ppm)	1974	125	56	+/- 33.8
Silver (ppm)	48.7	5.1	126	+/- 0.9

CRM Details

Control Statistic Details	Neutron Activation Analyte Results (ppm, unless otherwise noted)	Major Elements by Fusion / XRF (%)
Control Statistic Details Control statistics were produced from results accumulated in the October-1997 & April-1998 round robins. The number of results used to certify each analyte is shown in the table above.	Antimony 12.25 Arsenic 6.925 Barium <100 Bromine 1.56 Cadmium nr Caesium 24.9 Calcium (%) 1.54 Cerium 9.52 Chromium 2050 Cobalt 2010 Europium <0.5 Gold (ppb) 166 Hafnium 22.3 Iridium (ppb) <20 Iron (%) 4.69 Lanthanum 3.73 Lutetium <0.3 Mercury nr Molybdenum 647.5 Neodymium nr Nickel nr Potassium (%) 2.91 Rubidium 686.5 Samarium 1.33 Scandium 7.255 Selenium <5 Silver 45 Sodium (%) 1.465 Strontium nr Tantalum <2 Tellurium <10 Terbium nr Thorium 1.25 Tin nr Tungsten 4.21 Uranium <2 Ytterbium 1.4 Zinc 4725 Zirconium 743	Fe nr SiO ₂ nr Al ₂ O ₃ nr TiO ₂ nr MnO nr CaO nr P nr S nr MgO nr K ₂ O nr Na ₂ O nr LOI1000 nr Neutron Activation Analyses and Fusion / XRF Analyses are single results and are indicative only. These are provided for matrix identification purposes. nr: Not Reported
Material Description This material is described as a Low grade Cu,Pb,Zn from surface with laterite.		
Colour Designation (ISCC-NBS, SP449) This material is pale reddish brown in colour.		
Usage This product is for use in the mining industry as a reference material for monitoring and testing the accuracy of laboratory assaying.		
Preparation and Packaging All CRMs are dried in an oven for a minimum of 12 hours at 110°C. The dry material is then pulverised to better than 75 micron (nominal mean of 45 micron) using an air classifier. The material is then homogenised and stored in a sealed, stable container ready for final packaging.		
Materials are statistically sampled from stores, then packaged into either heat sealed, air tight, plastic pulp packets or screw top sealed plastic containers ready for distribution. All packaging has been chosen to ensure minimal contamination from outside sources during shipment, use and storage.		
Assay Testwork All standards are tested thoroughly in the Geostats bi-annual laboratory survey. This involves assaying by multiple laboratories from around the world. Results are compiled into a comprehensive report detailing statistics for each standard. Assay distributions are checked and processed statistically, producing monitoring statistics for these standards. Materials are tested regularly to ensure stability and homogeneity.		
Stability This product remains stable in its original packaging, away from direct sunlight.		
Material Safety This product is not hazardous and non-toxic.		

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 Website http://www.geostats.com.au

GBM398-4
 Geostats Pty Ltd, Certified Geochem Base Metal Reference Material, Product Code:

1. The challenge of high TDS

- 1% Pb – sub ppm trace elements and 96% recovery for 1% Pb
- Seawater analysis without pre-concentration steps
 - 32 ppt Cd for NASS-6 (31 ppt)
 - 5 ppt Pb for NASS-6 (6 ppt)
- 5% copper run without any manual pre-dilution steps
 - Silver and gold of particular interest
 - No need for expensive fire assay



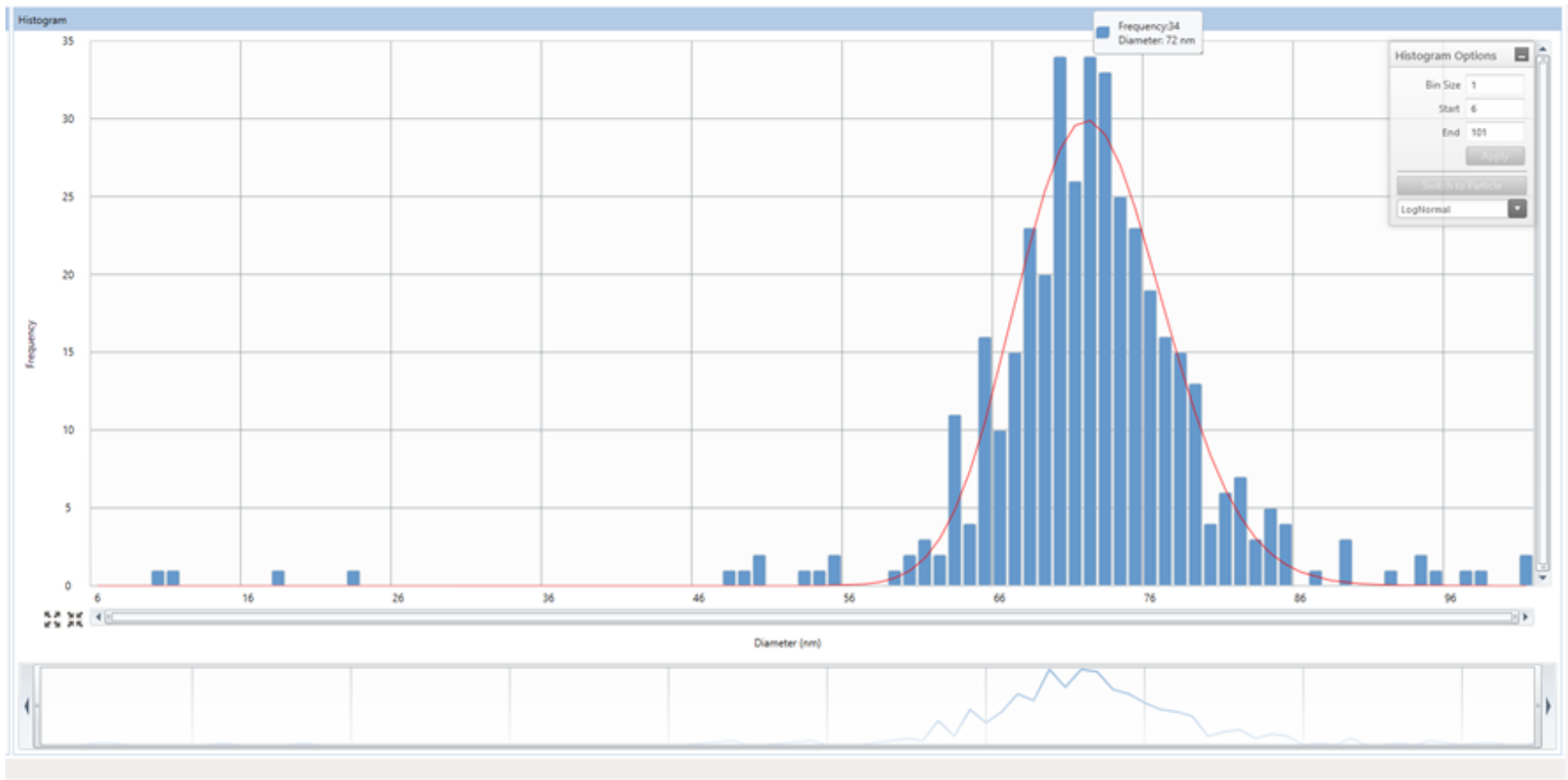
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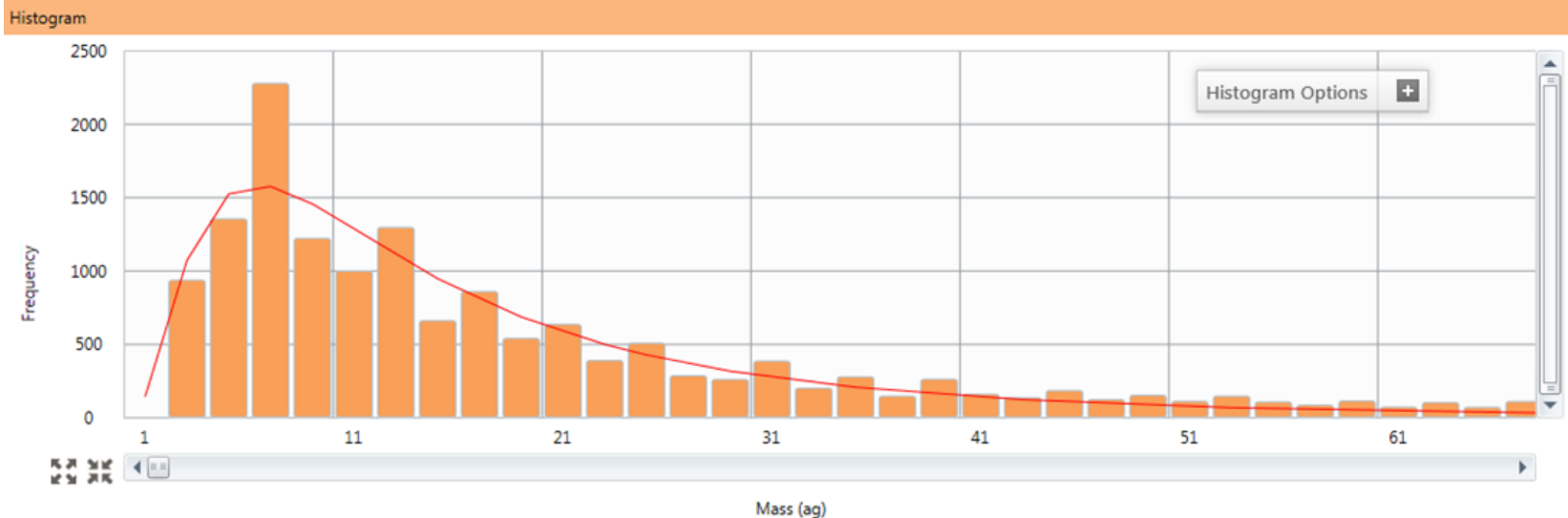
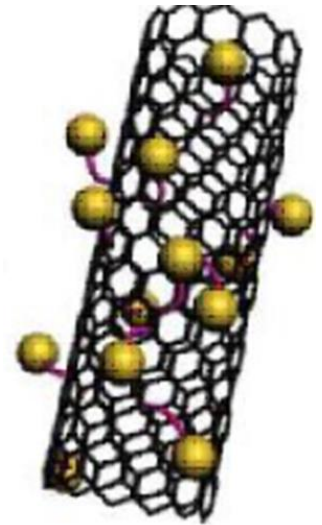
Application 2 – Nanoparticles and Single Cell

- Silver, dwell time 80 μs



Application 2 – Nanoparticles and Single Cell

- Single walled carbon nanotubes used for targeted drug delivery
- 20 nm Au NPs on outside, Lu on the inside
- Macrophage cells treated, Au and Lu monitored
- Highest frequency of Lu per cell was 6 attograms!



What you have learnt....



- New NexION ICP-MS
- High TDS applications
- Short dwell time applications

Please email me with your questions:
david.price@perkinelmer.com

