

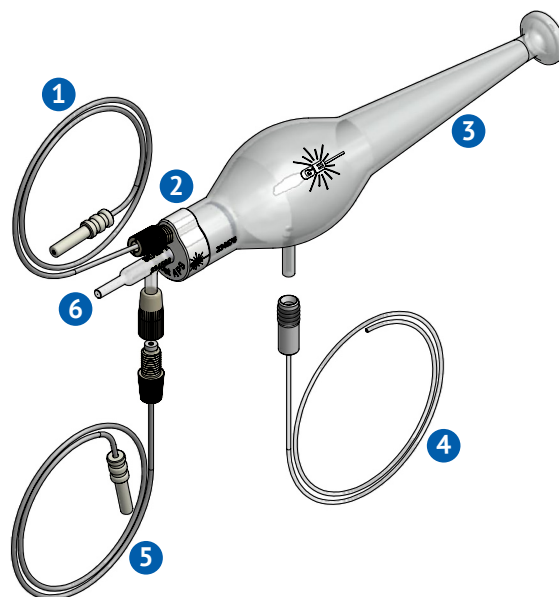
NEW High Sensitivity Single-Cell Sample Introduction System for ICP-MS

Single-cell analysis by ICP-MS (SC-ICP-MS) is enhancing the basic understandings in cellular biology, oncology and drug discovery. SC-ICP-MS provides quantification of metals in individual biological cells at ultra-low detection levels not previously seen in other techniques. SC-ICP-MS can be used to study disease aetiology, provide a better understanding of diseased cell states and develop new drug treatments for better patient outcomes.

The new Glass Expansion Single-Cell Sample Introduction System (SC-SIS) for SC-ICP-MS consists of a:

- High efficiency, low uptake rate, concentric glass nebulizer designed to efficiently nebulize single-cell suspensions without compromising cell integrity
- Low volume, on-axis spray chamber directly coupled to the ICP-MS for the highest transport efficiency of the nebulized cell suspension
- Patent pending MicroJet gas adapter shapes the nebulizer aerosol plume to reduce cell deposition on the spray chamber walls, enhancing the transport efficiency

In single-cell analysis, the aim of the sample introduction system is to convert a continuous stream of cell suspension efficiently into an aerosol made entirely of single cells into the analytical plasma. Critically, during the nebulization process the cells must remain intact and unruptured, to ensure each individual cell provides a single burst of ions in the plasma which can be measured by the mass analyser of the ICP-MS.



1	Make up Gas Inlet
2.	MicroJet Adaptor
3	Single-cell Spray Chamber
4	Drain
5	Nebulizer Gas Inlet
6	High efficiency Single-cell Nebulizer



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Spray Chamber with MicroJet Adaptor

Conventional ICP-MS spray chambers have low transport efficiencies (< 5%) and filter out larger droplets (>5µm) preventing a high percentage of cells from entering the plasma. As most cell lines of interest are larger than 5µm, the spray chamber design for single cell analysis is different from conventional ICP-MS spray chambers.

The low volume on-axis spray chamber with the patent pending MicroJet Adaptor to simultaneously provide a:

- On-axis, laminar high transmission efficiency spray chamber
- High velocity sheathing gas entraining and shaping the nebulizer aerosol plume to prevent cell deposition on the spray chamber walls
- Excellent washout between samples

High Efficiency Nebulizer



The novel design of the high efficiency nebulizer used in the Glass Expansion single-cell sample introduction system uses a low argon gas flow to provide high nebulization efficiency without rupturing the cell walls.

Glass Expansion's single cell nebulizer with proprietary VitriCone sample channel features:

- Superb transport efficiency at low sample uptake rates (15 to 45 µL/min) to ensure individual intact cells are transported into the plasma for measurement
- Constant diameter, large bore sample channel minimizes blockages from sample build-up commonly experienced with biological samples
- Rigid, precision machined thick-walled glass sample capillary gives the best analytical precision by resisting harmonic vibrations from the high linear velocity of the surrounding argon gas flow
- Inert, metal-free DC gas fittings with ratchet mechanism give reliable, reproducible leak-free Ar connections
- Easy to use, gas tight, zero dead volume sample fittings make connecting to the sample delivery system easy and reliable

Specifications	
Nebulizer	Low gas, high-efficiency concentric glass nebulizer
Spray Chamber Material	Borosilicate glass
Make-up Gas Addition	Inert MicroJet Adapter with 0.01 to 1 L/min flow rate range
Sample interface	Zero dead volume PEEK nebulizer connector



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