From Seawater to Shellfish: Microplastics… Find out what's slowly krilling you, and the best way to stay happy as a clam!

Ryan Brennan
President
Glass Expansion, Inc.
Rbrennan@geicp.com

Aaron Hineman
Inorganic Product Line Leader, Americas
PerkinElmer
Aaron.Hineman@perkinelmer.com

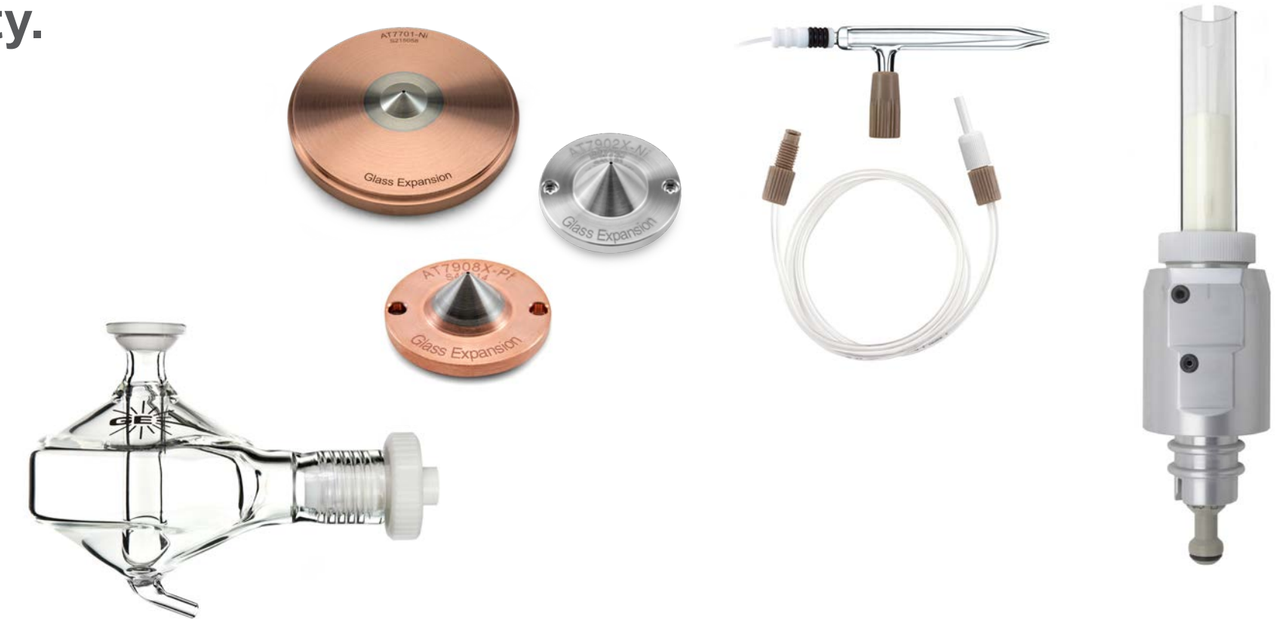
GLASS EXPANSION
Quality By Design

PerkinElmer®
Science with Purpose

Introduction

Glass Expansion has been designing and manufacturing ICP sample introduction components **for over 40 years.** We are globally recognized for its **quality** and **reliability.**

- Autosampler Probes
- Pump Tubing
- Nebulizers
- Cyclonic Spray Chambers
- Torches & Injectors
- RF Coils
- Cones
- Tools & Accessories



Glass Expansion Offices

Head Office

6 Central Boulevard
Port Melbourne VIC 3207
Australia

Phone: +61 3 9320 1111
Email: enquiries@geicp.com

Americas

31 Jonathan Bourne Drive,
Unit 7,
Pocasset, MA 02559 USA

Phone: 508 563 1800
Email: geusa@geicp.com

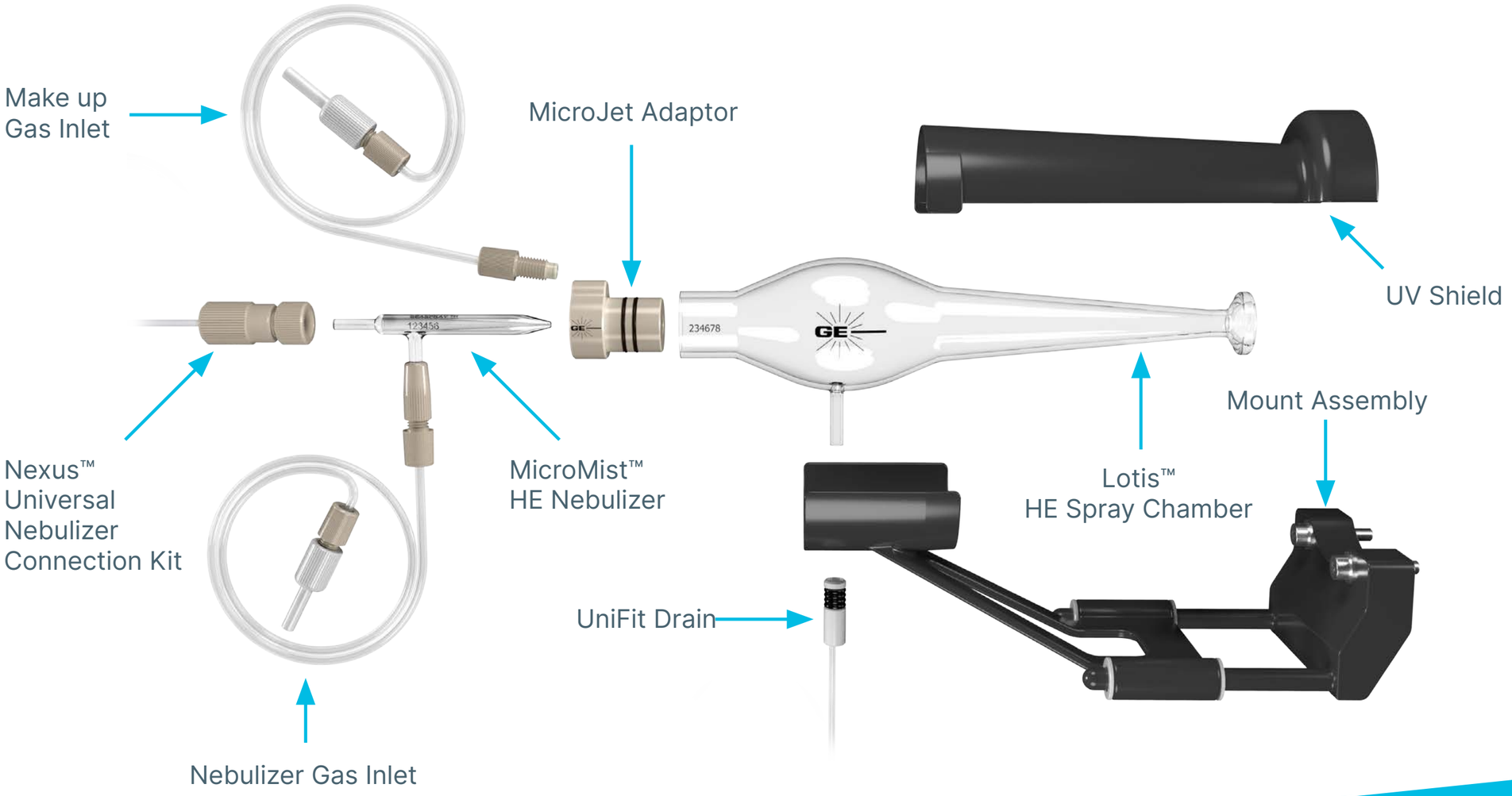
Europe

Friedenbachstrasse 9,
35781 Weilburg,
Germany

Phone: +49 6471 3778517
Email: gegmbh@geicp.com

www.geicp.com

High Efficiency Sample Introduction System (HE-SIS)



HE-SIS Kit Features

This specially designed concentric glass nebulizer is based on our popular MicroMist™ design, capable of efficiently nebulizing limited sample volumes at low sample and argon gas flow rates.

Our patent-pending MicroJet™ gas adapter shapes the nebulizer aerosol plume to reduce sample deposition on the spray chamber walls and enhance transport efficiency.

The Lotis™ HE spray chamber directly couples to the ICP-MS torch, providing the highest transport efficiency and excellent washout between samples.

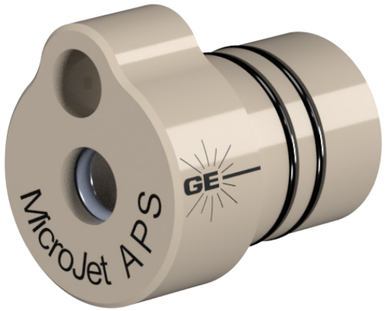
HE-SIS Bracket Support

Every HE-SIS is designed to suit a specific instrument model, and includes an instrument-specific mounting bracket support.

Part Number	Description
KT-1155	HE-SIS for Agilent® ICP-MS
KT-1172	HE-SIS for TOFWERK icpTOF
KT-1172	HE-SIS for Thermo Scientific® Q, RQ, TQ ICP-MS
KT-1172	HE-SIS for Thermo Scientific® Neoma MC-ICP-MS
KT-1184	HE-SIS for PerkinElmer® NexION 1000, 1100, 2000, 2200, 5000 ICP-MS
KT-1204	HE-SIS for PerkinElmer® NexION 300, 350 ICP-MS
KT-1205	HE-SIS for NU ATTOM
KT-1213	HE-SIS for Thermo Scientific® X-Series
KT-1215	HE-SIS for Thermo Scientific® Neptune/Element
KT-1219	HE SIS for Nu Vitesse

Optimizing Operating Parameters

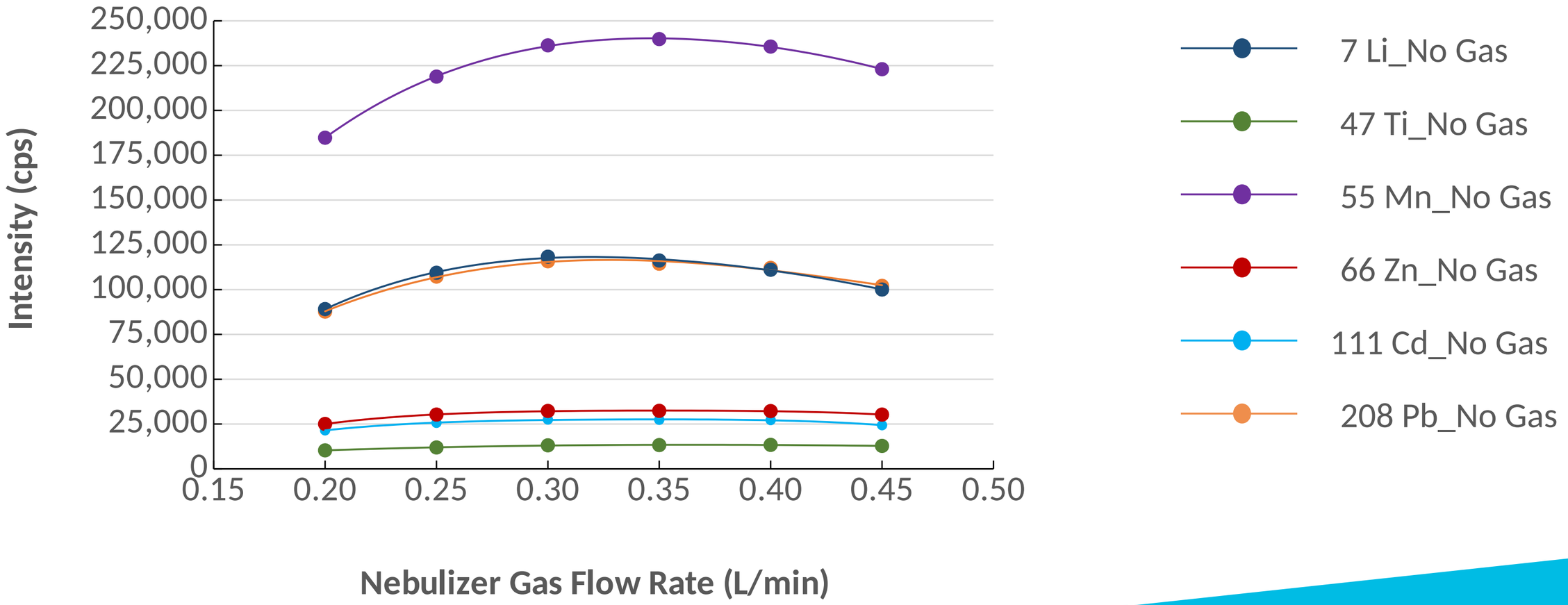
- Nebulizer gas flow rate (L/min)
- Nebulizer sample flow rate (µL/min)



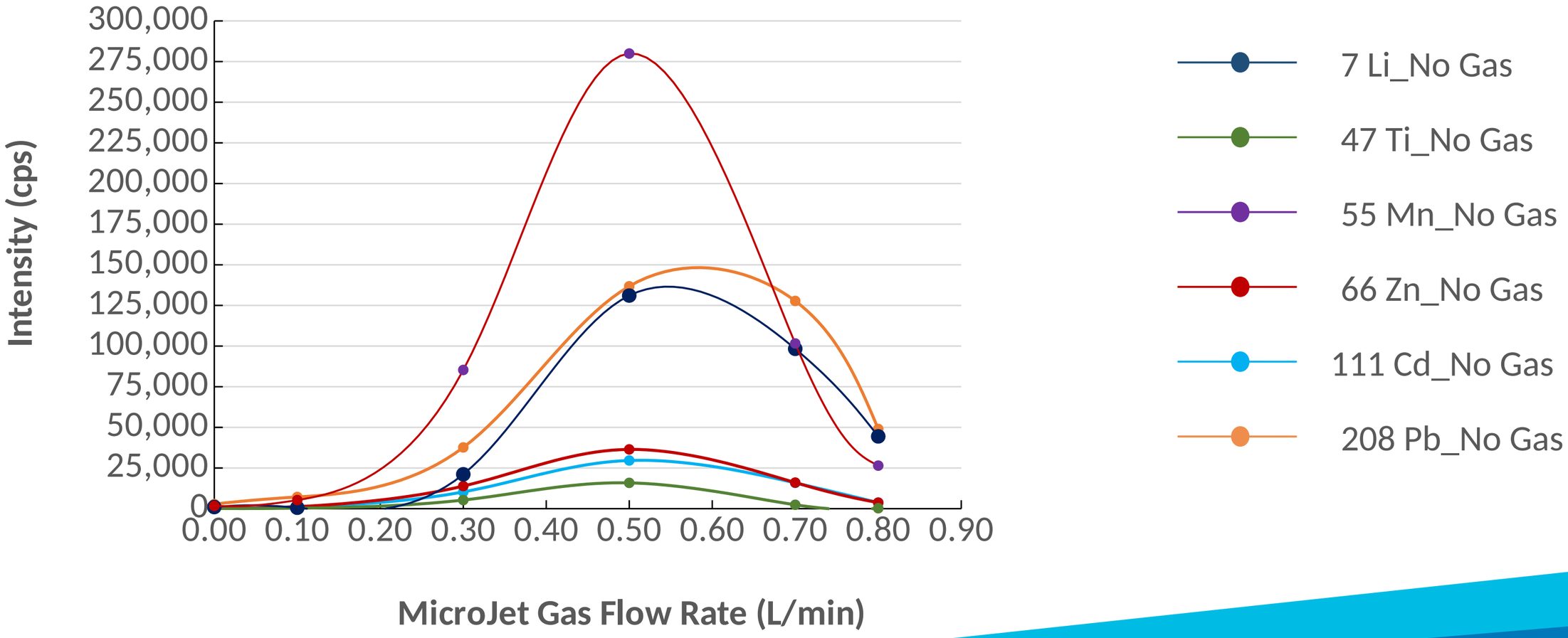
- MicroJet gas flow rate (L/min)

*Combined gas flow rate through the injector is typically close to 1.0 L/min

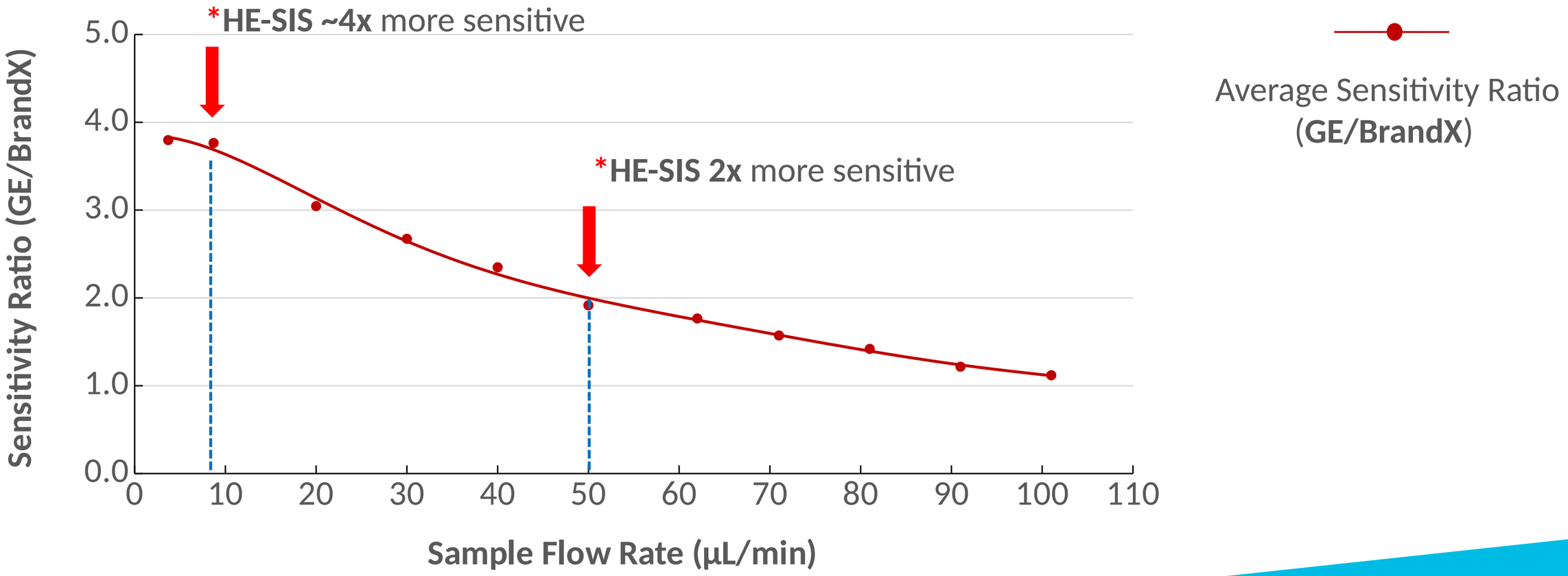
Optimizing Nebulizer Gas Flow Rate



Optimizing MicroJet Gas Flow Rate



Average Sensitivity Ratio – Comparison Brand X

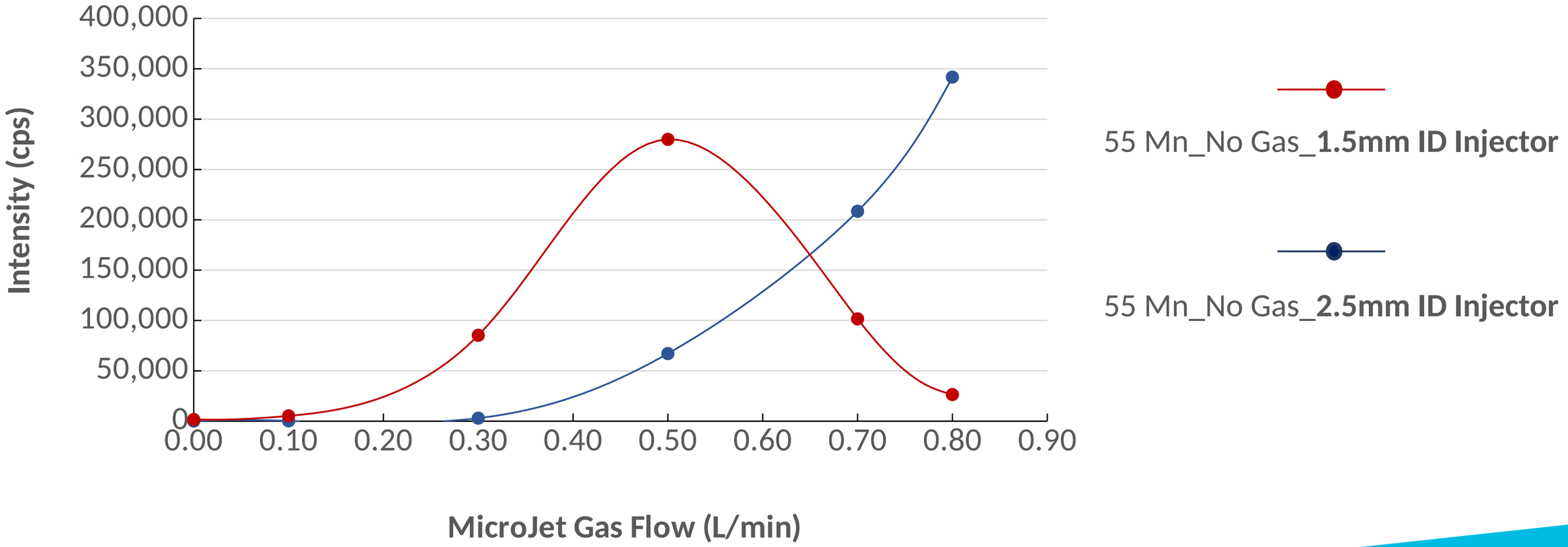


Demountable Torch – Interchangeable Injector

- A demountable torch provides the benefit of interchangeable injectors.
  - 1.5mm and 2.5mm ID quartz studied
  - Other injector ID's and materials available

* D-Torch™ for NexION 2200/5000 ICP-MS shown, P/N 30-808-3927

Sensitivity Comparison – Injector ID



HE-SIS Literature

The HE-SIS has been coupled to many different ICP-MS platforms for a wide variety of applications, including single-cell, single-particle, nanoparticle, and low-volume sample studies, such as nanoplastics and microplastics with up to **95% transport efficiency.**

- *Development of single-cell ICP-TOFMS to measure nanoplastics association with human cells, Environ. Sci.: Nano, 2023, 10, 3439.*
- *Breaking barriers in Microplastic Detection using Single-Particle ICP-TOFMS, Lyndsey Hendriks, TOFWERK.*
- *Towards Automated Routine Analysis of the Distribution of Trace Elements in Single Cells using ICP-MS, Current Trends in Mass Spectrometry, March 2020.*
- *Very low mass isotope data collection with the Nu Vitesse, measurement of microplastic particles, Vitesse Note NT10.*
- In addition to many scientific presentations.

HE-SIS Summary

- In order to achieve optimum performance, it is necessary to optimize all operating conditions for both the instrument and sample introduction system.
- Our example showed the optimum sensitivity was observed at a nebulizer gas flow rate of 0.35 L/min and sample uptake in the range of 20 to 40 µL/min.
- Glass Expansion's HE-SIS is 2–4x more sensitive than another commercially available system.
- Optimum make-up gas flow was dependent on the ID of the injector:
  - Smaller bore injector (1.5mm ID) provided highest sensitivity at a make-up gas flow of 0.50 L/min, combined gas flow of 0.85 L/min.
  - Larger bore injector (2.5mm ID) provided highest sensitivity at a make-up gas flow of 0.80 L/min, combined gas flow of 1.15 L/min.