



Consistent nano-ESI performance after emitter changes: Evaluating Trajan CB Emitters for reproducible proteomics

Introduction

In bottom-up proteomics, robust nano-electrospray ionisation is essential for generating sensitive, reproducible LC-MS/MS data. However, when emitter performance varies from one emitter to the next, laboratories can experience uncertainty in the reliability of their results, particularly after an emitter change. This lack of consistency can compromise intra-batch comparability, reduce confidence in the data, and force users to repeat entire batches of experiments, adding time, cost, and workflow disruption.

In a high-throughput proteomics lab, maintaining high-quality results and timely delivery for collaborators depends on emitters that perform consistently across routine workflows. Trajan CB Emitters are designed to support this need by delivering stable spray performance, robust operation, and minimal emitter-to-emitter variability. This application note demonstrates how Trajan CB Emitters help protect data integrity, reduce the need for reacquisitions, and improve confidence in proteomics results after emitter changes.

Experimental conditions

Liquid chromatography

Liquid chromatography	Thermo Scientific Vanquish Neo UHPLC
Analytical column	Thermo Scientific Acclaim PepMap RSLC C18, 2 μm , 100 $\text{\AA}$, 75 μm ID $\times$ 50 cm, nanoViper
Trap column	Thermo Scientific Acclaim PepMap 100 C18, 5 μm , 100 $\text{\AA}$, 100 μm ID $\times$ 2 cm, nanoViper
Mobile phase A	0.1% Formic Acid in Water
Mobile phase B	0.1% Formic Acid in 80 % Acetonitrile
Flow rate	250 nL/min

Mass spectrometry

Mass spectrometer	Thermo Scientific Orbitrap Eclipse Tribrid										
Ionization source	Thermo Scientific Nanospray Flex										
Emitter	Trajan CB Emitters, four types (two of each):										
	<table> <tr> <th>Part number</th><th>Description</th></tr> <tr> <td>063240000</td><td>Trajan CB Emitter, Gold Distal Coated Fused Silica, 360 μm OD $\times$ 10 μm ID $\times$ 50 mm L, PK5</td></tr> <tr> <td>063220000</td><td>Trajan CB Emitter, Gold Tip Coated Fused Silica, 360 μm OD $\times$ 10 μm ID $\times$ 50 mm L, PK5</td></tr> <tr> <td>063240100</td><td>Trajan CB Emitter, Gold Distal Coated Fused Silica, 360 μm OD $\times$ 20 μm ID $\times$ 50 mm L, PK5</td></tr> <tr> <td>063220100</td><td>Trajan CB Emitter, Gold Tip Coated Fused Silica, 360 μm OD $\times$ 20 μm ID $\times$ 50 mm L, PK5</td></tr> </table>	Part number	Description	063240000	Trajan CB Emitter, Gold Distal Coated Fused Silica, 360 μm OD $\times$ 10 μm ID $\times$ 50 mm L, PK5	063220000	Trajan CB Emitter, Gold Tip Coated Fused Silica, 360 μm OD $\times$ 10 μm ID $\times$ 50 mm L, PK5	063240100	Trajan CB Emitter, Gold Distal Coated Fused Silica, 360 μm OD $\times$ 20 μm ID $\times$ 50 mm L, PK5	063220100	Trajan CB Emitter, Gold Tip Coated Fused Silica, 360 μm OD $\times$ 20 μm ID $\times$ 50 mm L, PK5
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Voltage	1.8 kV										

Biological samples

Thermo Scientific Pierce HeLa Protein Digest Standard (100 ng injected per run).

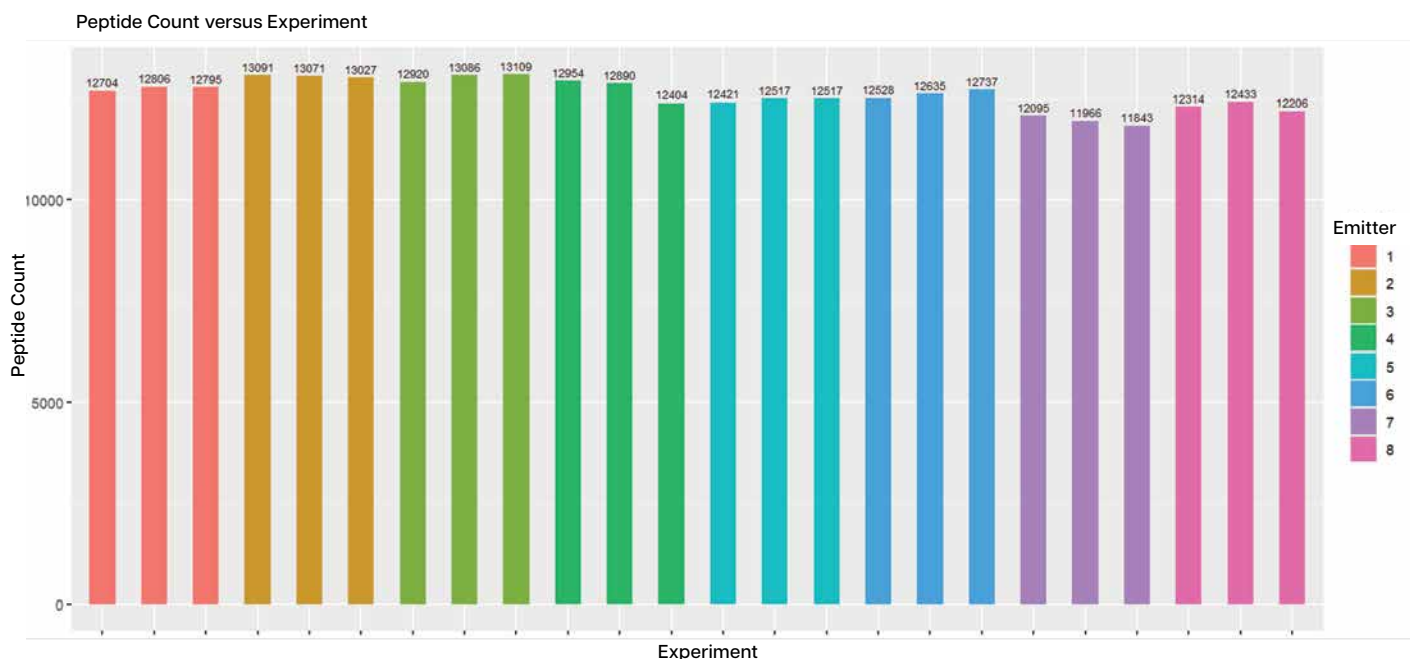


Figure 1: Bar chart presents the peptide identification counts across 24 experimental LC-MS/MS runs, color-coded by eight different Trajan CB Emitters with mixed IDs and coating types.

Results

Peptide identification counts across all runs are high and consistent with expectations. The variation across all 24 experiments is minimal indicating robust LC-MS/MS performance. Replicate runs using the same emitter demonstrated very low variance, showing excellent intra-emitter consistency.

Peptide counts were highly reproducible across the eight emitters, with a mean count of 12,628 peptides and a coefficient of variation (CV) of around 3%.

The emitter-to-emitter variation was on par with baseline variation of the instrument itself. This indicates that emitter-to-emitter performance is within the expected range.

Overall, the emitter manufacturing quality is very consistent, ensuring that all emitters perform consistently and meet the expectations of proteomics laboratory operators.



Figure 2: Microscopic inspection ensures consistent manufacturing quality.

Conclusion

Consistent emitter performance is critical to maintaining confidence in proteomics data, particularly in high-throughput laboratories where emitter changes can otherwise introduce uncertainty, delays, and repeat analysis. Across the LC-MS/MS runs evaluated, Trajan CB Emitters delivered stable, reproducible performance with minimal emitter-to-emitter variability, supporting reliable peptide identification and workflow continuity. By combining an expertly engineered constant bore design with robust nano-ESI operation, Trajan CB Emitters help laboratories maintain sensitivity, reduce downtime, and generate dependable results after routine emitter replacement.

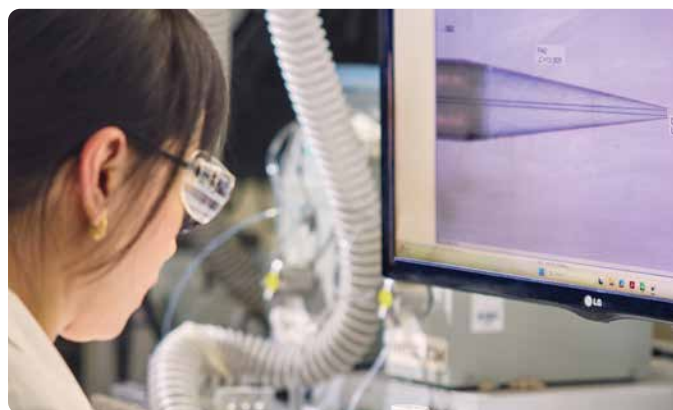


Figure 3: The constant bore is inspected for particulates.