

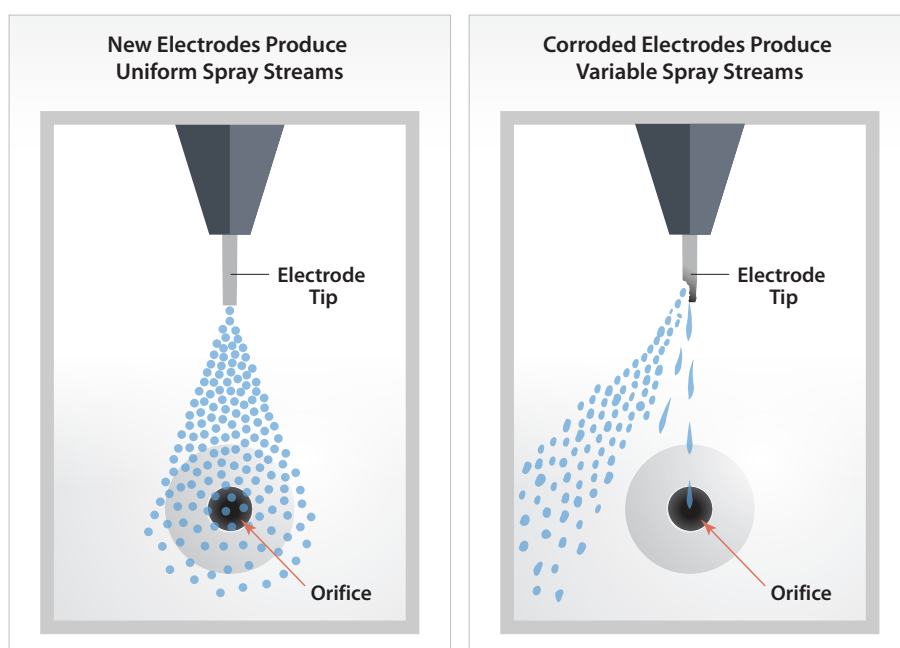


Get More Uptime with Restek's Long-Life ESI Electrode for Sciex Turbo V Sources

- Same LC-MS/MS performance as original equipment.
- Rugged electrode lasts longer and requires fewer replacements.
- Ensures more instrument uptime for sample analysis.

Electrospray ionization is the primary technique that LC-MS/MS labs use to convert the LC column effluent into ions for the detector. However, the high temperature, high voltage, acidic mobile phases, and elements (such as salts) in the sample create a corrosive environment in the MS source that can eat away at metal components. No part of the ionization flow path is more affected by this harsh environment than the capillary electrode. This delicate tube, typically made from stainless steel, is only a few thousandths of an inch thick. The constant flow, temperature, and voltage encountered in a high-throughput laboratory wear away the tip of the electrode as the spray emerges (Figure 1). Eventually, the tip will corrode to the point of failure and the uniform spray that had ensured a steady, sensitive signal will become deformed. When this occurs, the instrument will lose sensitivity, runs will fail, and sample throughput will cease while the instrument is taken offline for troubleshooting and maintenance. To help labs overcome this obstacle, Restek has developed the Long-Life ESI electrode (for use with Sciex Turbo V sources) that outlasts original equipment electrodes as demonstrated by the experiments shown here.

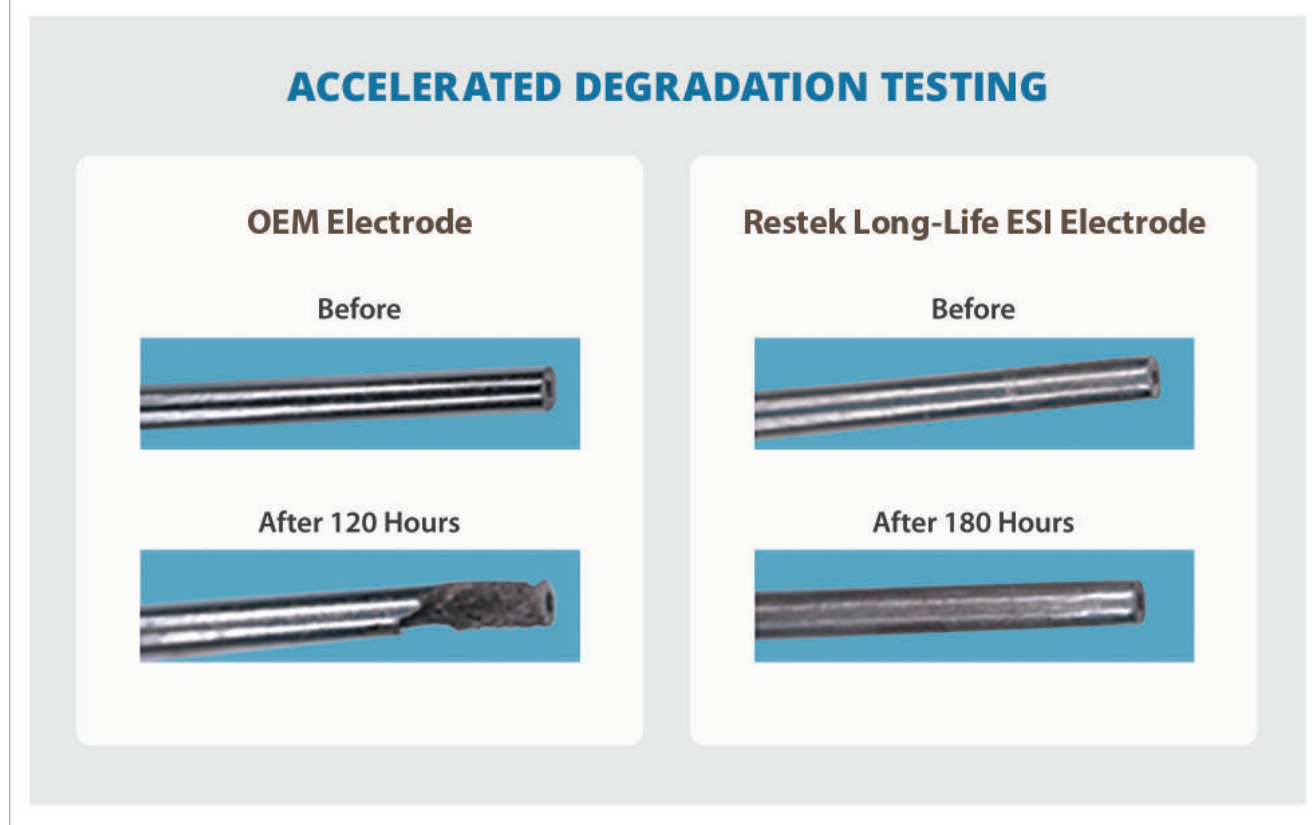
Figure 1: Corroded electrode tips produce poorly focused spray streams that result in decreased instrument sensitivity.



Longer Lifetime Means Higher Productivity

The lifetime of an ESI electrode can vary widely based on the mobile phases and additives used, frequency of operation, and nature of samples injected. So, how can you determine if one electrode will outlast another? We did it by testing both the original equipment electrode and a Restek Long-Life ESI electrode under an accelerated degradation protocol that pushed the limits of the electrodes quickly while still being relevant to actual operating conditions. We used an aqueous mobile phase with relatively high concentrations of trifluoroacetic acid and salt, then set the ion source temperature and voltage at maximum. A stock electrode from the original equipment manufacturer (OEM) was tested first. Everything was installed to the manufacturer's specifications and we inspected the electrode periodically for evidence of corrosion. At 100 hours, the OEM electrode did not show overt signs of corrosion, but at 120 hours extreme corrosion was observed and the electrode failed. Next, the Long-Life ESI electrode was tested, and it remained unchanged throughout the entire experiment. The final assessments are shown in Figure 2: the OEM electrode was irreparably damaged at 120 hours, while the Long-Life ESI electrode still appeared to be in new condition—even after 180 hours of exposure to the tough experimental conditions.

Figure 2: Restek Long-Life ESI electrodes for Sciex Turbo V sources last longer than OEM electrodes, so more samples can be analyzed with less downtime for maintenance.



Equivalent Chromatography Ensures the Same Performance

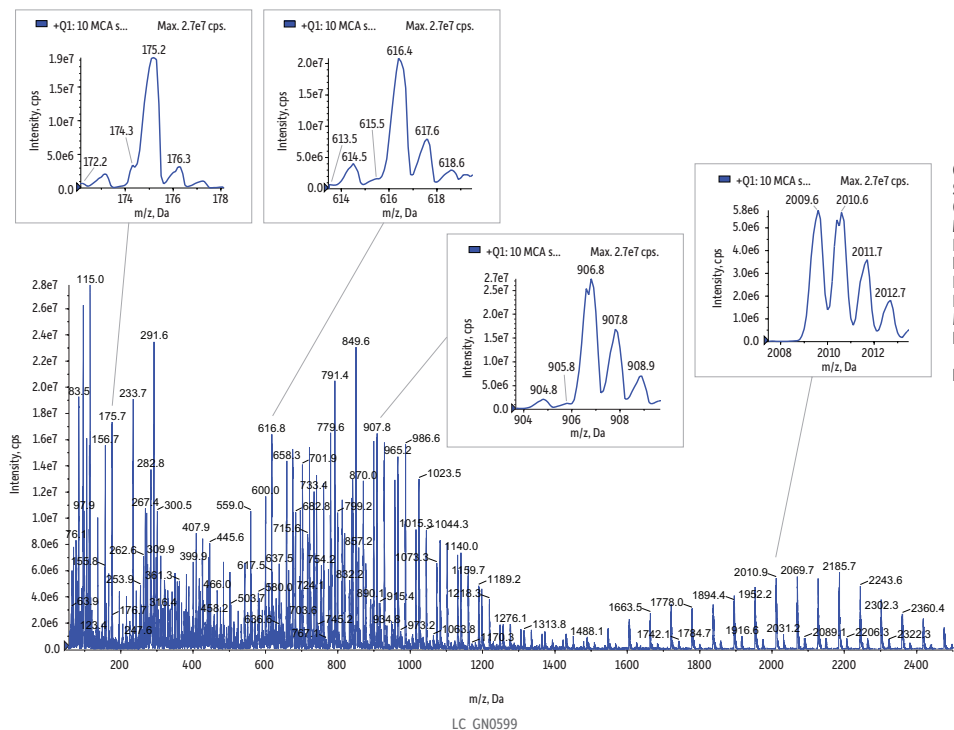
Longer electrode lifetime is only beneficial if the instrument performs as well as with the original part. To evaluate chromatographic performance, we compared our Long-Life ESI electrode to an OEM electrode by initially examining polypropylene glycol (PPG) ionization in all modes (positive, negative, Q1, and Q3), assessing both calibration ions and full scans. Results were very comparable (see example in Figure 3), so we injected an evaluation standard through the LC-MS/MS next. As shown in Figure 4, equivalent results were obtained. Because the Long-Life ESI electrode performed as well as the original electrode, analysts can now obtain the same LC-MS/MS performance they are accustomed to on a more robust system that will stay up and running longer.

Figure 3: Electrode comparison: polypropylene glycol analysis (ESI+, Q1, full scan with calibration ions shown in insets).

OEM Electrode

+Q1: 10 MCA scans from Sample 2 (Sciex Electrode_PPG_Pos_Full Scan)

Max. 2.8e7 cps



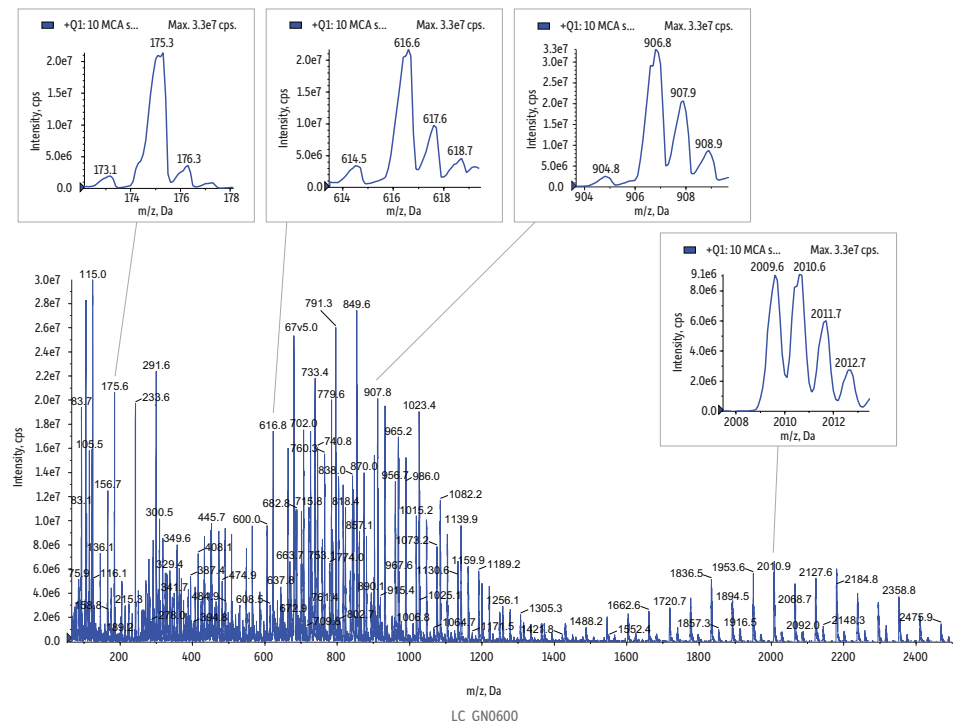
Column
Sample
Conc.:
Mobile Phase
Flow:
Detector
Ion Source:
Ion Mode:
Mode:
Instrument
Notes

Pos PPG 1x10-5 M
1x10-5 Molar
mL/min
API 4000
Electrospray
ESI+
MS scan
Applied Biosystems/MDS Sciex
LC-MS/MS System
Original equipment ESI electrode

Long-Life ESI Electrode

+Q1: 10 MCA scans from Sample 30 (Restek LL3 PPG Pos Q1 Full Scan)

Max. 3.0e7 cps.

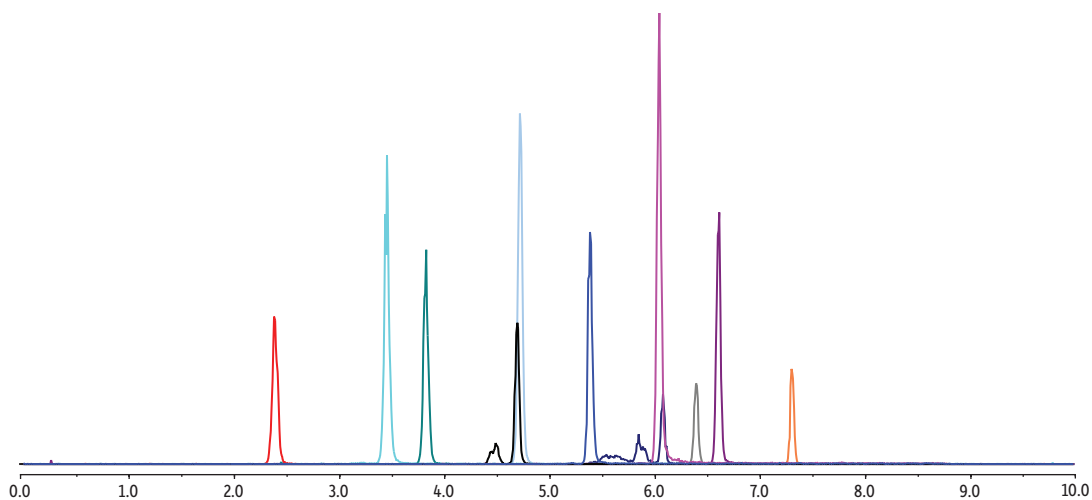


Column
Sample
Conc.:
Mobile Phase
Flow:
Detector
Ion Source:
Ion Mode:
Mode:
Instrument
Notes

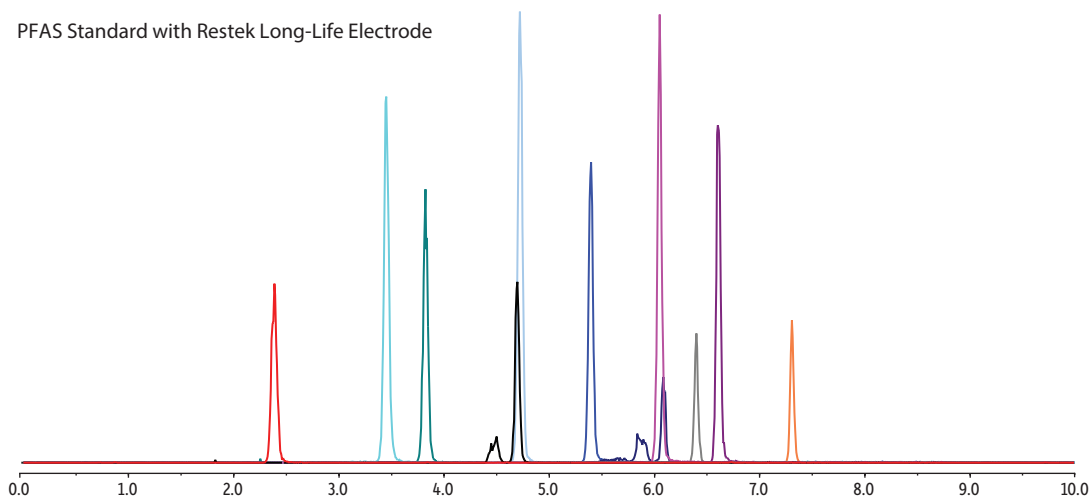
Pos PPG 1x10-5 M
1x10-5 Molar
mL/min
API 4000
Electrospray
ESI+
MS scan
Applied Biosystems/MDS Sciex
LC-MS/MS System
Long-Life ESI electrode

Figure 4: Electrode comparison: PFAS reference standard analysis (ESI-, MRM).

PFAS Standard with Original Equipment Electrode



PFAS Standard with Restek Long-Life Electrode



Time (min)

LC_GN0595

Column Raptor C18 (cat.# 9304552)

Dimensions: 50 mm x 2.1 mm ID

Particle Size: 5 µm

Pore Size: 90 Å

Temp.: 40 °C

Sample PFAS mix

Diluent: 96:4 Methanol:water

Conc.: 5-10 ng/mL

Inj. Vol.: 2 µL

Mobile Phase

A: 5 mM Ammonium acetate in water

B: Methanol

| Time (min) | Flow (mL/min) | %A | %B |
|------------|---------------|----|----|
| 0.00 | 0.4 | 75 | 25 |
| 8.00 | 0.4 | 10 | 90 |
| 8.01 | 0.4 | 75 | 25 |
| 10.00 | 0.4 | 75 | 25 |

Detector API 4000

Ion Source: Electrospray

Ion Mode: ESI-

Mode: MRM

Instrument Applied Biosystems/MDS Sciex LC-MS/MS System

In summary, testing shows that Restek Long-Life ESI electrodes for Sciex Turbo V sources provide equivalent ionization and chromatographic performance to original equipment manufacturer electrodes over significantly longer lifetimes. Because they perform the same and are less susceptible to corrosive conditions in the MS source, Long-Life ESI electrodes ensure more instrument uptime for sample analysis and are a particularly good choice for high-throughput laboratories.



Long-Life ESI Electrode

(for Sciex Turbo V Sources)

- Same chromatographic performance as original equipment.
- Rugged electrode lasts longer and requires fewer replacements.
- Ensures more instrument uptime for sample analysis.

| Description | Model # | Similar to Sciex Part # | qty. | cat.# |
|-------------------------|--|-------------------------|------|-------|
| Long-Life ESI Electrode | API 3200, 3500, 4000, 4500, 5000, 5500+, 6500, and 6500+ | 025392 | ea. | 25831 |



ESI Electrode Gauge

(for Sciex Turbo V Sources)

- For installing/replacing the ESI electrode in Turbo V ion source probes.
- Designed to ensure the correct electrode exposure distance from the probe tip.
- Provides a quick-and-easy visual confirmation of electrode exposure.

| Description | qty. | cat.# |
|---|------|-------|
| ESI Electrode Gauge for Sciex Turbo V Ion Sources | ea. | 25832 |