

Since their inception in 2001, Carrollton, Texas' PRECILAB has built a reputation as a leading analytical lab supporting the US and global semiconductor industry.

PRECILAB's main area of expertise is in the analysis of process chemicals for ultratrace metals with inductively coupled plasma mass spectrometry (ICP-MS). The lab uses single and triple quadrupole ICP-MS systems to perform low parts per trillion (ppt)-level analysis in a wide range of sample matrices.

As with any ultratrace metals analysis, sample collection and sample prep are as critical to the analytical process as the ICP-MS analysis itself.

For sample prep, PRECILAB designed and built sample preconcentration systems using PFA components from Savillex. By removing the sample matrix and preconcentrating the sample, PRECILAB's chemists can quantify at very low ppt level.

Sample collection, however, presented a different challenge. PRECILAB routinely sends empty, precleaned fluoropolymer bottles to its semiconductor customers worldwide. Customers fill the bottles with process fluids and ship them back to PRECILAB for analysis.

PRECILAB needed to find a fluoropolymer bottle that had ultra-low metals background, could be shipped around the world without leaking (even with organic solvents), and could dispense its contents without risk of spillage or contamination.

### Shipping Aggressive Chemicals Poses Challenges

David Ditter, PRECILAB's laboratory director, explains: "For about the first 15 years we were in business, we had used a specific teflon bottle to ship samples for analysis. While the bottle's performance was generally good, it had two weaknesses: The first was that, occasionally, bottles would leak during return shipping, which was clearly a hazard. But this also compromised the ultratrace metals analysis due to contamination risk."



"Since we switched to the Savillex bottles, we have not had a single leak in shipping – even with organic solvents that would have been challenging to ship with the previous bottle," - David Ditter, Laboratory Director



**Challenge:** Sample contamination and safety issue due to bottle leakage and poor pourability.



**Solution:** Savillex PFA and FEP lab bottles.



**Result:** Secure seal and drip-free pouring enables accurate analysis and safer handling.

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According to Ditter, the leaky bottle issue was made worse with organic solvents which because of their surface tension and viscosity can more easily leak from a bottle.

The second issue with the FEP Teflon bottles used by PRECILAB stemmed from poor “pourability.” “We dispense samples by weight, by pouring out routinely only a few grams. Pouring – not pipetting – is the cleanest way to prepare a sample for evaporation,” says Ditter. “The problem was that the bottle lip was not designed with pouring in mind, and invariably sample liquid would run back down the bottle’s thread. Any liquid remaining on the bottle would lead to a possible contamination when the second pour occurred into the next evaporation cup. Not to mention, there was a risk to the chemist when handling 49% hydrogen fluoride (HF) and other aggressive chemicals.”



*Savillex 1000 mL PFA Lab Bottle*

### PRECILAB Turns to Savillex for its' Fluoropolymer Bottle Needs

In 2018, PRECILAB decided to evaluate Savillex’s fluoropolymer bottle range. What attracted PRECILAB initially was the Savillex bottle’s design. In particular, the Savillex bottle neck had more thread turns than the bottle they had been using. Plus, the closure design appeared far superior. Also, since the bottle lip was injection molded, it was much smoother and appeared to have better “pourability”. All those impressions turned out to be correct, as following an initial trial, PRECILAB switched bottle suppliers in 2018 and have been using Savillex FEP and PFA lab bottles ever since.

“Since we switched to the Savillex bottles, we have not had a single leak in shipping – even with organic solvents that would have been challenging to ship with the previous bottle,” says Ditter. “In one case, a semiconductor customer in Taiwan needed to ship concentrated ammonium hydroxide to us for analysis and was worried about the pressure buildup that can occur with high concentration ammonium hydroxide solutions. We provided the customer with Savillex bottle specifications and design information, which alleviated the customer’s concerns.”

PRECILAB sent their Taiwanese customer Savillex bottles, which they filled with concentrated ammonium hydroxide and shipped back. “There were no leaks whatsoever,” says Ditter. “Bottle seal quality aside, the Savillex bottles also pour much better. The shape and smoothness of the lip allows our chemists to very accurately dispense small amounts of liquid without any drips – even with volatile organics – which makes for safer handling and eliminates contamination risk.”

PFA components and fluoropolymer bottles are not the only Savillex products used at PRECILAB, according to Ditter.



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"We use a lot of high purity nitric acid for cleaning, sample prep, and making up calibration solutions. Buying high purity nitric acid got to be very expensive, and we decided to make our own high purity acid and invested in Savillex DST systems," he explains. "We have DST-1000 and DST-4000 systems, and these have been working great. They cleaned up very quickly on installation and the acid they produce is better than 10 ppt grade."

From Savillex's side, the relationship with PRECILAB has been very positive. "It has been great working with PRECILAB" says Savillex Product Manager, Steve Barrett. "We always learn from working with knowledgeable customers and that supports the continued development of our products."



*Savillex DST-4000*

The Savillex logo features the word "Savillex" in a bold, blue, sans-serif font. A green checkmark is positioned to the left of the letter 'S', and a blue horizontal line is drawn underneath the entire word.