

Protective Ruler for Nanospray Tubes

By Jack Belgum, Ph.D.

HPLC fused silica tubes are widely used for making nozzles for various types of mass spectroscopy techniques. The tubes are drawn down to the desired tip diameter using the Sutter Instrument P-2000/F laser-based micropipette puller. The puller heats the glass with an infrared laser in order to get the fused silica to soften enough to draw properly. HPLC tubes normally come covered with a thin but tough layer of plastic. This plastic layer must be removed from the portion of the tube that is to be heated in order to allow the laser heating to function properly and to avoid depositing soot on the optics of the puller.

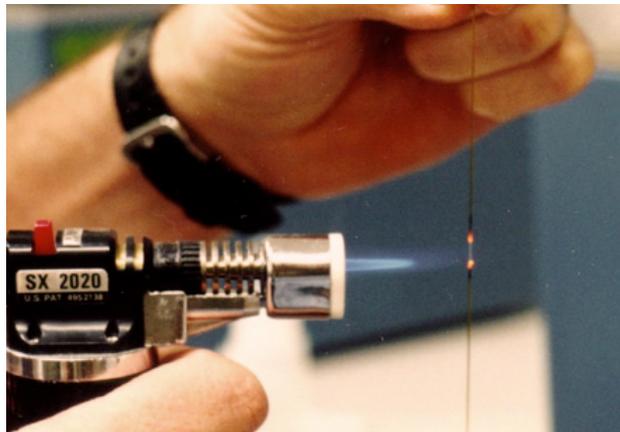


Fig. 1

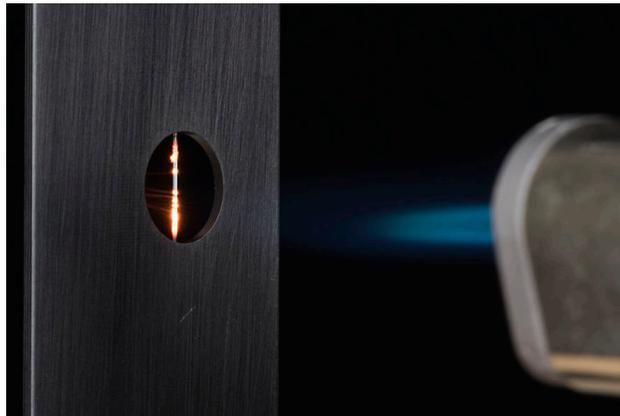


Fig. 2

There are several possible ways to remove the plastic layer. The most common practice is to burn the plastic off. This can be done fairly well with some practice using only an inexpensive butane torch, as shown in Figure 1. It helps to keep the tubing vertical and to spin it in your fingers while moving the flame up and down. The plastic chars quite quickly and then flakes off with further heating in this manner. The butane torch can soften the fused silica enough to cause it to bend due to gravity acting on the lower segment,



if it is not held vertically. The heat from the torch often becomes unpleasant, particularly if the length of tube between your fingers and the point of heating is small. It was clear that this process could be improved.

To that end, Dr. Guisen Jiang of the Uniformed Services University of the Health Sciences has developed a Protective Ruler that makes the process of preparing the tubes much more straightforward. With this tool, good results can be obtained without the typical trial and error learning process of the hand-held approach. The flame is applied from the back side of the ruler (see Figure 2) so that only the portion of the tube within the oval cut-out is exposed to the flame.

The Protective Ruler is made from aluminum and is black anodized. It has a V-groove machined along the length of the ruler, and clamps for holding the tubes. This is similar to the glass holding system on the puller bars of the P-2000/F. Centered on the V-groove, at the middle of the ruler, is an oval cut-out as shown in Figure 3 that allows localized access for the flame of the torch.

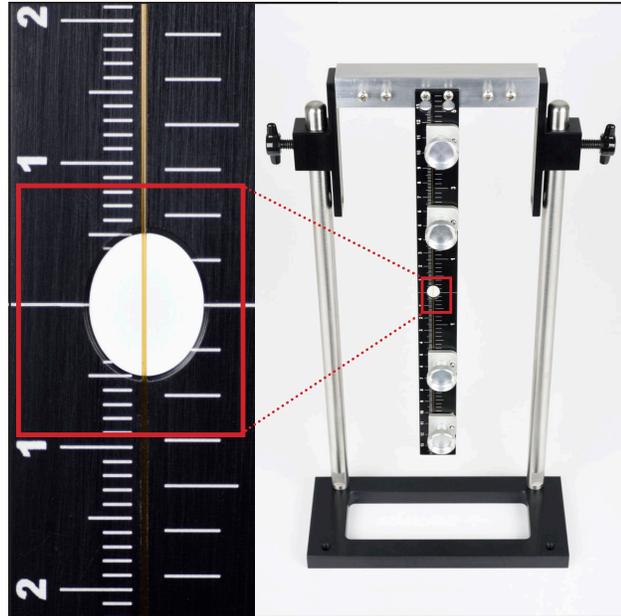


Fig. 3

The Protective Ruler is marked in centimeters and inches with fine divisions in millimeters and eighths of an inch. These divisions start at the center of the ruler and increase in both directions making it easy to center any length of tubing up to 250 mm or 10 inches.

The primary object of the ruler is to clamp the tube in a straight line so that the tube will not bend even if excessive heat is used. The oval access hole for the torch flame ensures that the length of tube that is treated will be restricted and repeatable. Finally, there are two mounting holes at the top of the Protective Ruler that make it easy to hang from a fixture. Please note: the holder shown in Figure 3 is not included in the price of the Protective Ruler (Sutter Part # - PR)

Please contact us for more information.

