

Cleaving Fused-Silica Tubing

Introduction

Proper cleaving of fused-silica tubing is a critical but often overlooked operation in the preparation of emitters and columns prior to use. A flat, smooth cleave is essential for maintaining low dead volume connections with other sections of fused-silica tubing. It is also critical that cleaving does not generate flow-stopping particulate matter. Cleaving is best accomplished with a high-quality diamond chip or sapphire cleaving tool. New Objective's 1 mm wide diamond-blade cleaving tool, shown in Figure 1A, has been selected to provide a consistent, flat cleave with a minimum of particulate generation. Inexpensive carbide scribing tools are not recommended, since they generally result in poor-quality (i.e., ragged) cleaved end faces that generate many fine particles.

WARNING: Handling of fused-silica tubing and emitters can result in serious personal injury, including skin and eye injury. Use safety glasses or goggles meeting ANSI Z87.1-1989 requirements or the equivalent. Puncture- and chemical-resistant gloves should be worn at all times.

Procedure

1. Place the tubing to be cut on a flat, clean surface and position the cleaving tool perpendicular to the tubing surface, as shown in Figures 1B and 2C. The long axis of the blade should be perpendicular to the tubing bore (Figure 2B).
2. Gently press straight down; DO NOT use a sawing motion when pressing the blade. You only need to nick the surface of the polyimide coating (Figure 3C). Be careful not to force the blade through the tubing, which will generate a ragged end and many particles (Figure 3D).
3. Pull gently on the tubing along its axis; it should easily separate at the point of contact. If it does not, repeat the procedure with a little more force. A typical cleave of 360 μm OD, 75 μm ID fused-silica tubing is shown in Figure 4. Residual surface irregularity is on average less than or equal to 10 μm .

Inspection of the distal end of the tip for particle contamination using a light microscope with transmitted light at 100x magnification is highly recommended. New Objective sells an accessory kit that contains all the high-quality tools (cleaver, special forceps, ruler, etc.) you will need to properly handle fused-silica emitters, columns, and tubing. Please see our catalog or Web site for a full description of our Micro Tool Kit (stock number TIP-KIT).

The information contained in this circular is believed reliable and accurate; however, nothing set forth herein constitutes a warranty or representation of any kind or nature. CAUTION: Particular end-user applications for these products may be restricted by existing patents. Complying with any such patent is the sole responsibility of the user. PicoTip and PicoTip Powered are registered trademarks of New Objective, Inc. New Objective reserves the right to change product specifications without notice. ©2004 New Objective, Inc. All rights reserved.

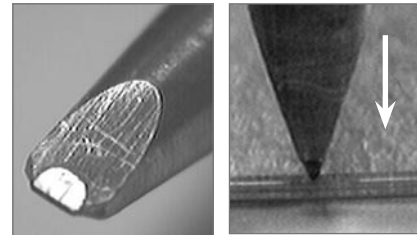


FIGURE 1 (A) Close-up view of diamond-blade cleaving tool, and (B) Cleaving tool in proper position

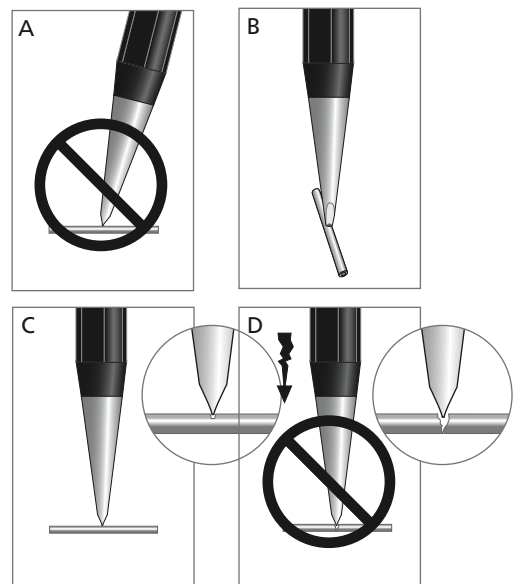


FIGURE 2 (A) Improper cutting angle (B) Align cleaving tool perpendicular to tubing (C) Press down gently, scoring tubing (D) Too much downward pressure will crush tubing, producing particles that can cause tubing to clog

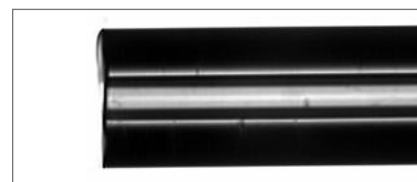


FIGURE 3 Typical cleave. (Polyimide coating was removed after cleaving for clarity of image.)