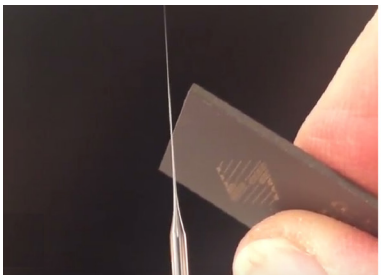
SUTTER INSTRUMENT

TECHNOTES

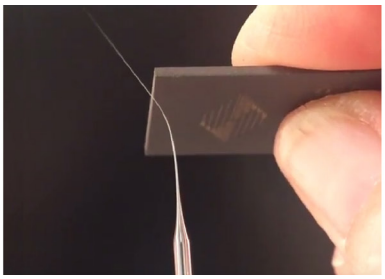
Using the Ceramic Tile (CTS) to Create 20µm-200µm Pipette Tips

Creating micropipettes with a tip size over 20µm is often difficult without using a mechanical device to score and break the glass. Microforges are often used to create a tip size between 5µ-20µ; but once a larger tip is needed, the delicate filament on a microforge is often too fragile to effectively break the glass cleanly. It is in these circumstances that we recommend using a ceramic tile (Sutter Product #CTS) to create a tip between 20µm and 200µm with a clean 90-degree break.

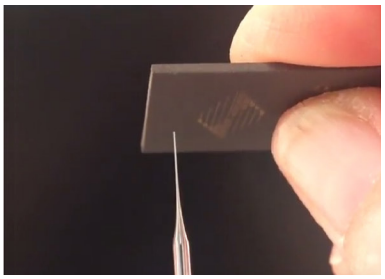
The images shown are taken from the webinar Achieving the Impossible - Large Patch Pipettes, Large Tips, Long Tapers and Beveled or Polished Tips. To watch a demonstration of the 'Score, Bend & Break' technique, advance to time code 17:55 minutes into the video.



Score but don't break



Push on glass above score



Break the glass

The four front edges of the square tile (marked by Sutter logo) are rough and should be used for scoring the glass. You can use a microscope at 50 to 100x magnification to examine the taper of the pipette and determine where the pipette needs to be scored to create a specific tip size. You can also "blindly" score the glass: starting high and moving down the taper, using a little trial and error to find the proper location. Approximately 3mm below the tip, the glass ID is 25µm, half way down the taper the glass ID is 50µm and approximately 3mm above the shoulder of the taper, the glass ID is 100µm. You will find that the flexibility of the glass decreases as the diameter of the taper increases, making it easier to score the glass at tip sizes over 50µm.

To create a tip size between 20µm to 200µm, first pull the glass capillary to create a long taper. With a Sutter Instrument P-87, P-97 or P-1000 Micropipette Puller, and thin or thick walled glass, use parameter settings similar to the following:

HEAT	PULL	VEL	TIME	PRESSURE
RAMP +30	0	150	0	500

Remove the pipette from the puller, hold it vertically up against a dark background and tilt the glass so the light in the room reflects off the glass. Using a front edge of the ceramic tile at 45 degrees to the glass taper (with the Sutter logo side of the tile facing the glass), score the glass in a perpendicular fashion. Use a small sideways motion across the glass (<1mm motion) with very slight pressure so the glass does not break while scoring. If the glass breaks while being scored, it will most often create a bad, uneven break. After scoring the glass, use the tile to push on the glass just above the location of the "score" to break back the glass.

If you find the glass is too flexible to effectively score and break the glass cleanly, or if you want to score the glass at tip sizes under 20µm, you will need to use Aluminosilicate glass which is stiffer and can be more easily scored at tip sizes between 10µm-20µm. Alternately, you can use a microforge. It can also be difficult to score and break the glass if the taper is too long or the glass is too thin. To address this issue, you can choose to create a shorter taper by decreasing the heat or the velocity, or you can switch to thick walled glass, such as: B100-50-10, B120-60-10, B150-86-10 and B150-75-10.

IMPORTANT: We recommend the use of protective eyewear and that you break the glass in a sideways direction and not toward your face.

For additional assistance, please contact Sutter Instrument at +1 415-883-0128.

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