

Guide to Polishing Crystals

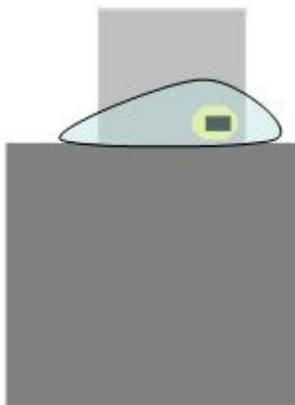
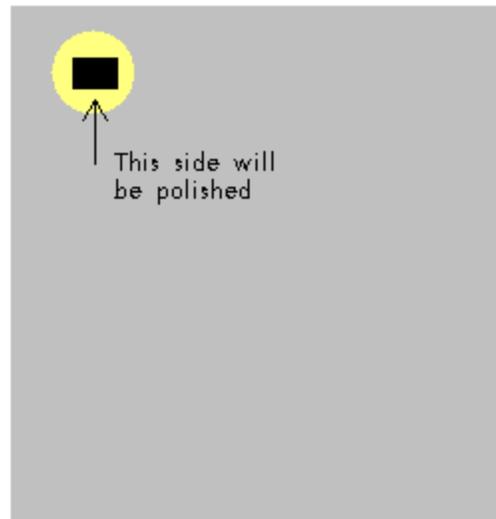
By Joel Strand

Materials:

- Crystal
- Tweezers
- Coverslip
- Polyamide
- Razor blade
- Sandpaper disks (I use 200 and 600 grit)
- Lapping films (I use 1micron and 0.1micron)

If your sample is small, or if you want to polish an edge of a rectangular crystal or polish at a non-90 degree angle, mount it on a coverslip first. Place a coverslip on the hotplate under the microscope in 316. Put a drop of polyamide in a corner of the coverslip, and place your sample in the drop. Align it with the edge of the coverslip and remember that the inside edge is what will get polished. Cure the polyamide at 45 degrees for 10 minutes, then ramp it up to 80 degrees for 10 minutes.

Now take your sample and materials down to the sample preparation room in the basement. It may take some searching, but you should be able to find a hand-polisher with three Teflon capped micrometers, a sample puck that screws into the polisher, some crystalbond, and a glass plate on the bench.



Put the puck on the hotplate (there should be an aluminum block it fits in) and place some crystalbond on top to melt. Once the crystalbond is gooey, push the coverslip in edgewise, so that it is standing vertical (it won't stand on its own yet, though) and press the crystalbond up around it with the side of a razorblade so that the sample is surrounded. Use short, quick touches of the razorblade because while crystalbond won't stick to cold metal, as soon as the blade heats up, it will start sticking and make accurate control very difficult. Take the puck off with the tongs that should be nearby, and adjust the coverslip with your finger to keep it vertical until the crystalbond hardens and holds it in place.

The excess glass of the coverslip that sticks above the crystalbond should snap off very easily between your fingers, and can be thrown in the sharps container.

Now get out the coarsest sandpaper you have and put some water on top for lubrication and to remove the sanded particles. You can start using the polisher from this point on, if you want, but I usually start by just holding the puck in my hand and rubbing it around to quickly get through the several millimeters of crystalbond above the sample, since the polisher goes in very small increments. When you can see that you're getting close to the sample, switch to the polisher. Screw the puck into the hole, and adjust the three micrometers so that the Teflon caps are above the top of your sample. Use the little round glass bubble level to level out the polisher. Once you've leveled it, start twisting the micrometers by equal increments until the caps are level with the top of the sample. You know you've reached the top when you place the polisher on the glass plate and it can rock around rather than being totally stable.

Polishing works best if you don't expose more than about 5 microns with coarse sandpaper, and about a micron with fine sandpaper and lapping films. A figure eight pattern of polishing works the best, and don't press down on the polisher. Let the weight of it do the work for you, and just slide it around. After you can feel that the polisher has leveled out, and most of the polishing is done, you can apply some pressure to make sure everything is evenly polished.

There is a microscope with a long field of focus that you can use to check your progress. When you're done with a level of sandpaper, rinse off the disk into the tub in the sink (not the drain, that much grit will accumulate in the pipes) and blow dry the disk with the nitrogen hose. Make sure to wipe off the polisher, the sample, and the Teflon caps before using a finer grit, so that you don't transfer large particles that will ruin the sandpaper or lapping film.

To use the lapping films, make sure the glass plate is clean, then put some water on top and gently place the lapping film on top of the water so that there are no air bubbles underneath. Once the film is in place, put some more water on top for lubrication, and polish just as you did with the sandpaper. Clean off the lapping films by gently patting them dry with kimwipes when you're done.

When you've finished polishing to your heart's content, you can put the puck back on the hotplate, remove your sample and the leftover crystalbond, and go extract your sample by soaking it in acetone.