Buehler Minimet 1000 Polisher/Grinder Instructions for Use (Round Samples)

PREPARATION:

1. Clean metal stages (Figure 1) and back of sample with 2-propanol. Mount round sample on metal stage with double-sided permanent tape. Make sure not to touch the part of the tape that will be holding the sample. Make sure to push down very hard on top of a tissue. (Sample facing down into tissue)
2. Determine the grit of the SiC sanding disc (Figure 2) for your sample. Use the scratched glass discs for polishing with the sanding disc, and use the newer glass discs for the diamond paste.
3. The back of the sanding disc peels off to reveal a sticky side. Adhere the sticky side of the sanding disc to the glass disc (Figure 3) using the same technique as used on the metal stages.
4. Make sure the sanding disc is completely stuck on the glass disc. Avoid touching the surface of the sanding disc with your hands.
5. Use a different polishing bowl (Figure 4) for each sample. It is important to use the same bowl throughout the procedure for each sample.
6. Match up the notch in the glass disc with the bowl and then set the glass disc in the bowl. Make sure that the glass disc is sitting flat in the bowl.
7. Put the bowl on the platform of the machine so that it locks into place. (Dots on bowl should be facing either perpendicular or parallel to polishing arm.)

Figure 1. Metal

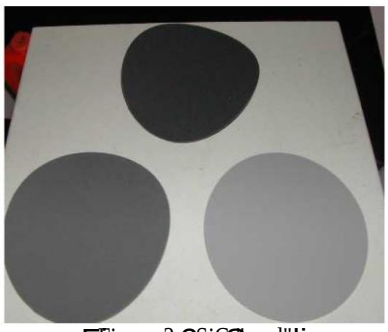

Figure 2. Sanding

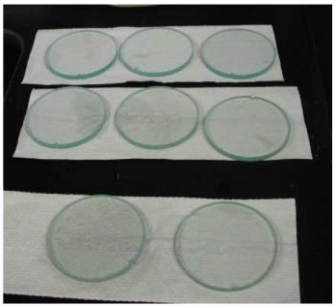

Figure 3. Glass

Figure 4. Polishing

POLISHING WITH SANDING DISC:

1. Squirt about 5 drops of soap and water solution from the squeeze bottle onto the sanding disc.
2. Lift lever and fit sample stage into the peg. The sample should be facing down.
3. Turn on the machine.
4. Use Table 1 to determine the proper settings for the machine based on the grit of the sanding disc. The appropriate settings may be entered by pressing the select mode button to toggle through the menu. When the light is lit up next to the setting you want to change, press the up or down arrows to adjust it. The soft stop setting should always be on. (The force should be in Newtons. If it isn't, turn off the machine and reset it)
5. The bowl should look like Figure 5 before starting the polisher. Start the machine by pressing the Run button. The machine will start out slowly. Once it gets up to the set speed and load, the timer will start counting down.

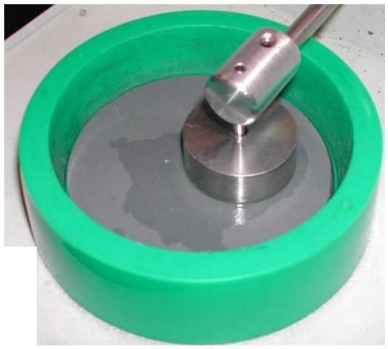

Figure 5. Ready to begin Polishing

6. Once the machine stops, wait for the timer to stop blinking.
   WARNING: Do not left lever until after the timer stops blinking. The polishing arm will break if you force the lever up.
7. Lift lever and remove sample.
8. Rinse the sample with deionized water after each step, and examine the surface finish. Set the sample and stage down on a clean surface with the sample facing up.
9. Before moving to the next Grit level, make sure that the surface polish is uniform. If the finish is not uniform, repeat that polishing step. The scratches can be inspected with a microscope. Circular scratches are not bad.
10. Repeat the procedure until you're finished polishing with 1200 grit.
11. The sanding disc can be removed by soaking the platen in the sink and peeling off the paper.

POLISHING WITH DIAMOND PASTE:

1. Mount the polishing cloth onto a newer glass disc. Use nylon cloths for 9 micron diamond paste and microcloths for 6, 3, and 1 micron(s).
2. Using the syringe of diamond paste (Figure 6), apply 2 or 3 small beads of paste in the center of the cloth. Apply 3-4 squirts of polishing oil from the nebulizer. (Figure 7)
3. Note: You do not need to completely cover entire cloth with the paste.
4. Spread the paste over the cloth by using half of another cloth.
5. Load the bowl onto the Minimet 1000 and set the machine to the appropriate settings. (Use the same speed and load settings as 800 and 1200 grit.) Spray 2-3 squirts of polishing oil onto the cloth for lubrication. Do NOT lubricate with soap and water.

Figure 6: Diamond paste (3 micron)

Figure 7. Nebulizer

REMOVING THE SAMPLE:

1. Take the sample and stage and hold it on it's side on a tissue.
2. Carefully slide an exacto knife in between the sample and the stage.
3. Slowly loosen the sample, but don't let it fall face down on the tissue.
4. When it's loose enough, grab the sample by the edges and pull it off of the stage. Remove any excess tape from the stage or from the back of the sample.

TROUBLESHOOTING:

- If the sample becomes dislodged from the stage while the machine is polishing, there could be some serious scratches depending on how hard it fell off. You may have to go back 1 or 2 grits and start the procedure over again just to get rid of these scratches.
- After a sample falls off, clean the back of the sample and the stage with deionized water for about a minute. After drying them off, clean the stage and the back of the sample with 2-propanol. Allow them time to dry. Finally, make sure your hands do not touch the part of the tape that adheres the sample to the stage.
- If the sample starts chattering (skipping on top of the surface) during the first 10 seconds or so, stop the machine immediately. Try rotating the bowl 90 degrees and start over. This chattering may have created some small scratches around the edge of the sample. An extra run on the same grit may be necessary.

Table 1: Typical Grits and Minimet 1000 settings

Grit	ANSI/CAMI (pm)	Load/Force (N)	Speed	Time (min.) Change to new grit before each 5 or 3
180	78.0	50	50	5,5,5
240	51.8	30	50	5,5,5
320	34.3	15	40	5,5,5
400	22.1	15	30	5,5
600	14.5	10	10	5
		20	30	5
		20	30	5
800	12.2	20	30	3,3,3
1200	6.5	20	30	3,3
9 um		20	30	3
6 um		20	30	3

3 um		20	30	3
1 um		20	30	3

- For all grits, change if sanding disc starts lifting off the glass disc.
- If the sample's surface polish doesn't seem uniform, repeat that step until the surface finish is uniform.
- After polishing with 600 grit sanding disc, minimize handling the sample to avoid scratching the surface.
- These steps are a generic procedure. You may alter the procedure to better suit your samples.