| **7/25/2023** |  | | | |  |
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| Objective | Planning on doing one or two more trials at 70pa, and then trying out 90pa. | | | |  |
| Accomplishment/  Reflection |  | | | |  |
| Cold stage size | | 51 mm | | |  |
| Cold stage height | | +8 mm | | |  |
| Distance of detector from stage  (5-10mm) | | 5 mm | | |  |
| Probe current (70-90) | | 70 | | |  |
| Accelerating voltage (Vacc) (12-17kV) | | 12 k/v | | |  |
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| Time (Since start of trial) | Action/observation | Temperature | Pressure (25-150 Pa, 40 most common) | Working Distance  (3 factors: focus, mag, stage height)  Error message if not from 9-11 mm | Magnifi-  cation |
|  | Starting the first trial at 70pa. |  |  |  |  |
| 0:00 | *Case 1.0:* Located a crystal in the top middle of the area. Suspiciously similar to the last crystal from yesterday. Hmmm. **Note: crystal was still growing during imaging.** | -37.5 | 70 | 8.9 | x65 |
| 2:00 | *Case 1.1:* Crystal has developed in a way where we have a good view of two prismatic/pyramidal facets and a decent view of basal. **Note: crystal was still growing during imaging.** | -36.4 | 70 |  |  |
| 4:04 | *Case 1.2:* Something is growing on the downward facing prismatic facet. Almost looks like another crystal forming there. **Note: crystal was still growing during imaging.** | -34.6 | 70 |  |  |
| 6:11 | *Case 1.3:* Crystal is still growing, which follows along with our knowledge of the Clausius-Clapeyron equation. **Note: crystal was still growing during imaging.** | -32.7 | 70 |  |  |
| 8:30 | *Case 1.4:* Early signs of ablation roughness on the prismatic facets. **Note: crystal was still growing during imaging.** | -30.6 | 80 |  | x55 |
| 10:51 | *Case 1.5:* Very defined roughness on the prismatic facets that will be great for analysis. Basal facet has shrunk significantly, which we notice as a consistent trend. Ablation visible on one of the bottom facing pyramidal facets. | -28.8 | 80 |  |  |
| 12:50 | *Case 1.6:* Ablation in lower regions of the crystal. Maybe it has something to do with pressure/temperature at edges vs center of the copper stage. | -27 | 80 |  | x55 |
| 14:50 | *Case 1.7:* Grabbing one more image at what seems to be equilibrium point. **Case 1.5 (growth) and cases 1.6-1.7 (growth/ablation) should be good to use for roughness analysis.** Definite ablation on the right hand side of the crystal. | -27 | 70 |  |  |
| 17:00 | *Case 1.8:* Ablation now occurring near the basal facet. Lots of roughness on the beveled surface is showing up now, which is much later in the process than we saw at lower pressures. | -28.7 | 60 |  |  |
|  |  |  |  |  |  |
| 0:00 | *Case 2.0:* Found a crystal located on the left side of the copper stage with prismatic facet up. Images from detector B looked very promising. **Note: crystal was still growing during imaging.** | -38.0 | 70 | 8.6 | x60 |
| 2:16 | *Case 2.1:* Weird shape forming at the bottom of the crystal. **Note: crystal was still growing during imaging.** | -36.4 | 70 |  |  |
| 4:20 | *Case 2.2:* **Note: crystal was still growing during imaging.** | -34.4 | 70 |  |  |
| 6:45 | *Case 2.3:* Very visible roughness among prismatic facets. Structure is quite globby. Noticing that crystal shape is much more variable and random at higher pressures. **Note: crystal was still growing during imaging.** | -32.6 | 70 |  | x47 |
| 8:55 | *Case 2.4:* Lots of cracking around pyramidal edges of crystal. **Cases 2.2-2.4 will be good subjects for growth roughness.** It looks a little bit like ablation, but the crystal is also still growing ever so slightly. **Note: crystal was still growing during imaging.** | -30.6 | 70 |  | x45 |
| 10:55 | *Case 2.5:* Crystal is finally done growing. Early signs of ablation as pyramidal facets are seeming to cave in. | -28.8 | 70 |  |  |
| 13:00 | *Case 2.6:* Crack forming in the middle of the crystal, which is an unusual place for ablation to start shrinking the crystal. | -27.0 | 80 |  |  |
| 14:56 | *Case 2.7:* Maintaining temperature for one more image. Crystal is noticeably shrinking. The caving in at the pyramidal facets is becoming more visible. | -27.0 |  |  |  |
|  | Resetting for a trial at 90pa. |  |  |  |  |
|  | The crystals were growing too fast to image. Resetting and giving it one more shot. |  |  |  |  |
| 0:00 | *Case 1.0:* Image found at top center of stage. Prismatic facing up. Rounder than crystals we’ve seen grown at lower pressures. **Note: crystal was still growing during imaging.** | -34.4 | 90 | 8.9 | x100 |
| 2:30 | *Case 1.1:* Continuing the cooling process since the calibration image was done at a higher temperature. **Note: crystal was still growing during imaging.** | -36 |  |  |  |
| 6:40 | *Case 1.2:* Imaging one more at this temperature for roughness analysis. **Note: crystal was still growing during imaging.** | -36.3 | 90 | 8.8 | x50 |
| 8:20 | *Case 1.3:* Not much roughness forming yet. Structure is a little abnormal. **Note: crystal was still growing during imaging.** | -34.4 | 90 |  |  |
| 10:16 | *Case 1.4:* Sections that break off of the main crystal seem to be hexagonally shaped. May just be smaller crystals forming off of the main crystal. Crystal is much smoother overall at this temperature than crystals at other pressures. **Note: crystal was still growing during imaging.** | -32.5 | 90 |  | x47 |
| 12:08 | *Case 1.5:* Some roughness starting to form around the prismatic facet. However, it is still a fairly smooth overall surface. | -30.4 | 90 |  | x47 |
| 14:00 | *Case 1.6:* Some growth roughness starting to bleed into the primary prismatic facet. However, early ablation signs are visible underneath the facet. | -28.6 | 90 |  |  |
| 16:12 | *Case 1.7:* Ablation roughness is starting to bleed into the main prismatic facet, but growth roughness still seems to be the primary roughness on the section. | -26.8 | 90 |  |  |
| 18:19 | *Case 1.8:* Ablation starting to become more prominent. Corners starting to cave in, and roughness patterns becoming more spaced out. Crystal is chipping away and shrinking on the right hand side. **Shrinking/chipping away always seems to be on the side furthest from the basal facet.** | -25.0 | 90 |  |  |
| 20:50 | *Case 1.9:* Trying to maintain temperature at equilibrium to prevent further shrinking. More jagged sections emerging on the surface. | -24.2 | 100 |  |  |
| 23:00 | *Case 1.10:* Capturing last images. Cannot seem to find a balance where ablation roughness is very noticeable, and the crystal is not shrinking a lot. Likely harder to obtain at higher pressures. | -24.2 |  |  |  |
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