

Cathodoluminescence Imaging on the Hitachi S-3400N

March 7, 2022

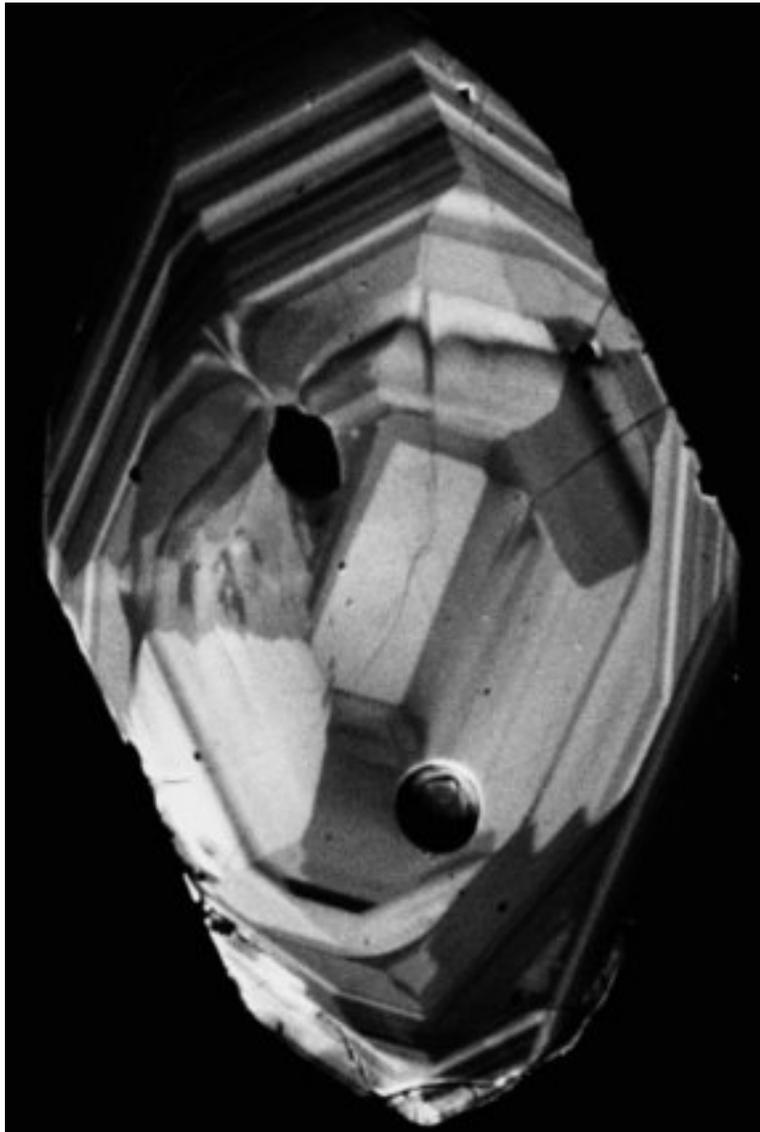


Figure 1: Cathodoluminescence Image of Zoned Zircon

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1 Introduction

2 Sample Introduction

- Press the "AIR" button on the front of the microscope to vent the chamber. Venting takes about two minutes, and the microscope will beep when venting is complete.
- Open the chamber fully, remove any sample and holder.
- Insert the CL detector. To insert press the brass locking button and gently push in the detector until it hits its hard stop.
- Measure the height of your sample mounted on the holder with the brass stub using the scale. Add 35mm to the measured height. This is the number you will enter in the sample height field. If you are using the dedicated zircon mount holder enter a value of 15mm for the sample height. Select a value for the sample width (this is the width of the holder). The value is not important if you will not be tilting the sample. Click on "Stage Move". The stage will move to the position you entered. Check visually that the sample will sit below the CL detector when it is inserted.
- Gently close the chamber door, if you feel any resistance stop immediately and check your sample height.
- Once the door is fully closed, press the "EVAC" button on the front of the SEM. The chamber will pump down within three minutes.

3 Beam Conditions

- Set the aperture to position 2.
- Select an accelerating voltage of 15kV.
- Select a beam current of about 70-75.
- Select the SE detector in the Image pane on the right of the GUI.
- Turn on the beam (Acc. V. ON).

4 Imaging and Alignments

- At a low magnification, adjust the brightness and contrast to get an SE image.
- Focus and stigmatize the image.
- At low magnification adjust the aperture X and Y knobs to maximize the image brightness. N.B. Only adjust one at a time, never both at once!
- Open the alignments panel ("Align"). Adjust the aperture align to remove any image movement using the SEM control panel X and Y knobs. This should be performed on a small feature on the sample so the image shift is apparent.
- At the lowest magnification adjust the beam shift and tilt using the X and Y knobs to maximize image brightness.
- Turn on the MiniCL control box.

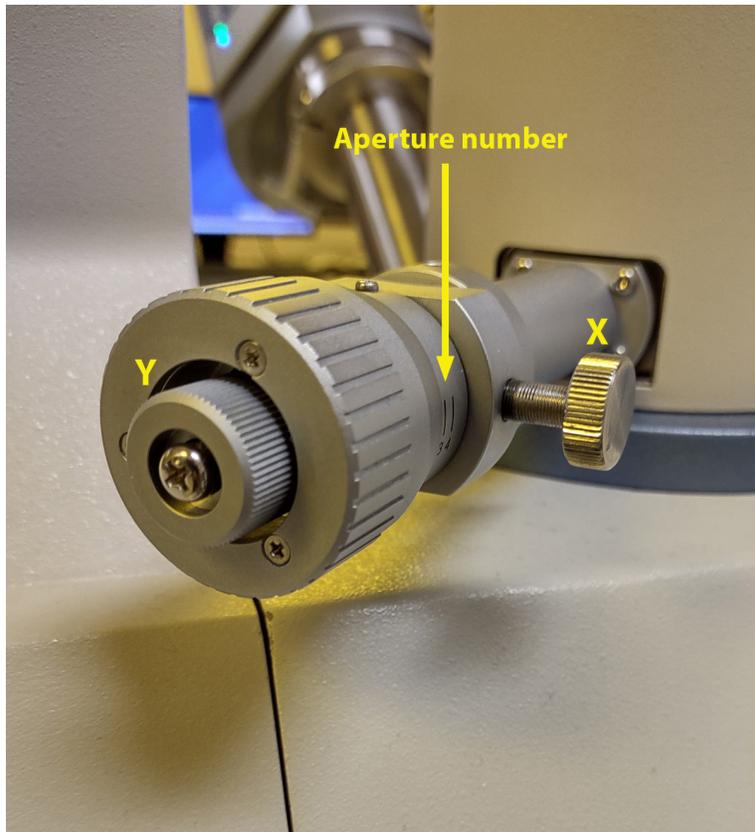


Figure 2: Aperture adjustment

- Move to the desired field of view and switch to the MiniCL detector in the "Image" pane, it is labelled "OTHER 1".
- Adjust the brightness and contrast of the CL image using the MiniCL control box. Use the S1 or S3 scan rates. It may be optimal to capture the images with fairly low contrast, the contrast can be increased in post processing.

5 Image Capture

- Select the image resolution scan rate in the image capture dropdown menu.
- Click the image capture icon to collect the image.
- The image is stored in the buffer across the bottom of the screen. The buffer only holds 10 images. These images must be saved to either the hard drive or an external drive.
- To save all the images in the buffer, select all, click save

6 Sample Removal

- Turn off the beam.
- Vent the chamber using the "AIR" button on the front of the SEM or select "AIR" in the GUI.

- Remove the sample and holder.
- Close the chamber and pump using the "EVAC" button on the front of the chamber.

7 Retraction of CL detector

Always retract the CL detector after use! The detector sits below the pole piece and can be damaged if hit by a taller SEM sample. Gently pull out the detector until it locks.