

Acquiring SAED patterns of polycrystalline specimens

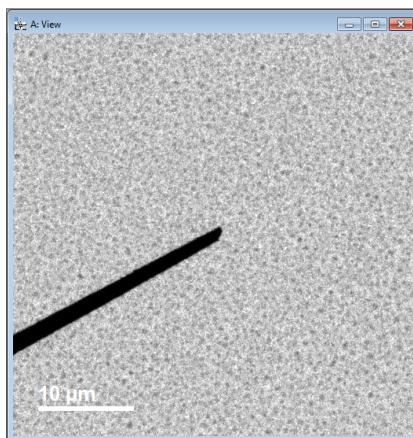
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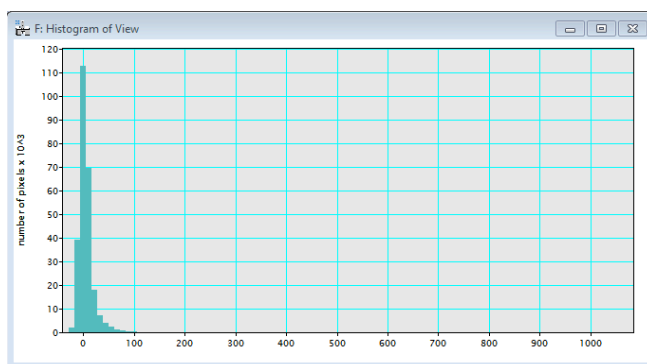
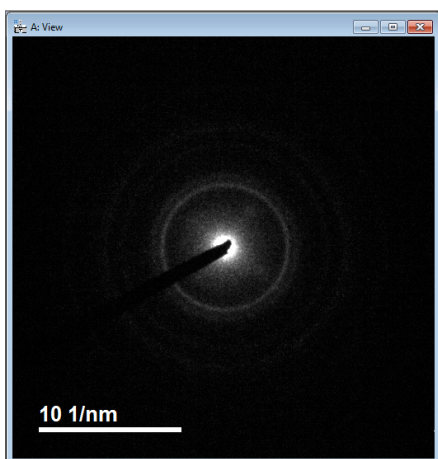
Last updated: 05/04/15

1. Perform normal alignment of the instrument in “MAG1” mode using the usual method with “ α -SELECTOR” = 3.
2. Set “SPOT SIZE” = 5 and perform gun tilt alignment: activate “ANODE WOBB” (L1 panel), select “GUN” under “DEFLECTOR” (R2 panel), use “DEF” (R2 panel) so the beam expands and contracts evenly.
3. Correct condenser lens astigmatism: activate “COND STIG” (L1 panel) and use “DEF X” and “DEF Y” (L1 and R1 panels) to stigmatize the beam so it is circular.
4. Set magnification to $\sim 20 \text{ k}\times$ and expand beam clockwise from crossover so it is approximately the size of the small screen and center it on the screen
5. Start viewing a live image of the specimen in Digital Micrograph; insert the beam stop into the image so the tip is centered in the live image; flip the viewing screen back down when finished.

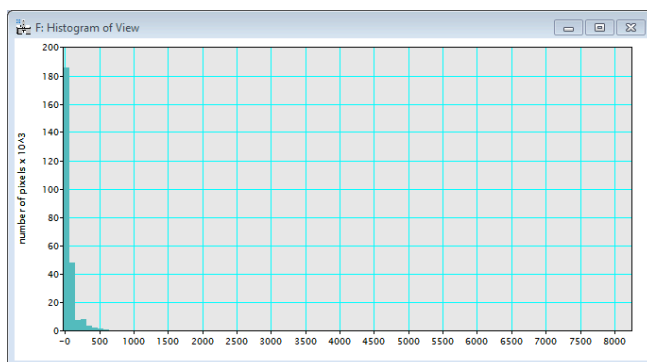
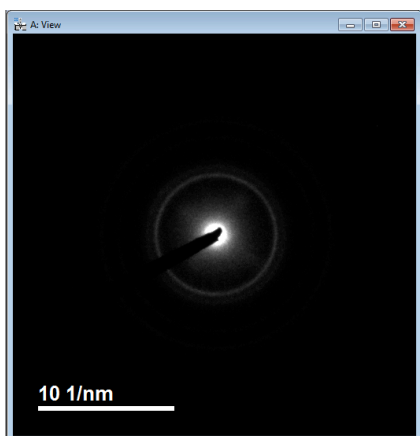


6. Enter “DIFF” mode and adjust the camera length to the desired setting (typically, $L = 15 - 25 \text{ cm}$ will be sufficient for most situations).
7. Insert the objective aperture into the DP and focus the aperture edge using “DIFF FOCUS”; then focus the direct spot in the DP using “BRIGHTNESS”.
8. Return to “MAG1” mode, center the beam on the viewing screen (DO NOT adjust “BRIGHTNESS”), and move the area of interest for DP collection to the center of the screen.

9. Return to “DIFF” mode and focus the DP using “DIFF FOCUS”; under “DEFLECTOR” (R2 panel), activate “PROJ” and use “SHIFT” (R2 panel) to shift the DP so the direct beam is under the tip of the beam stop.
10. Flip the viewing screen up, set the exposure time in “Camera View” to 0.001 s, and start acquiring a live DP (it should be quite grainy and noisy)
11. Along the top menu bar, select “Analysis” and “Histogram” to view a histogram of the live DP (the DP should look quite grainy and noisy). The rightmost value along the x-axis displays the maximum counts present in the DP.

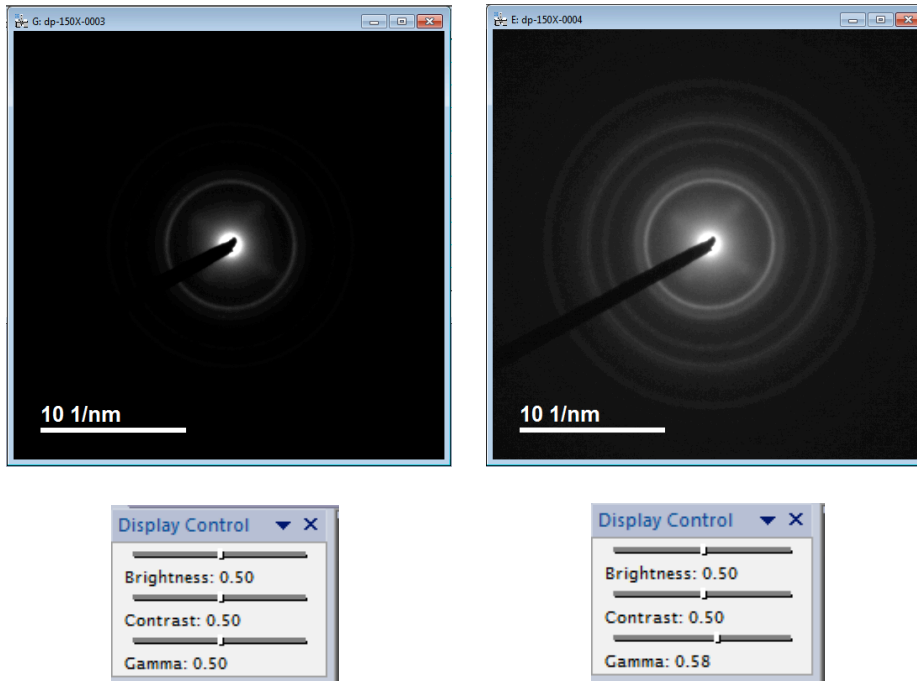


12. Adjust the exposure time in “Camera View” until the rightmost value in the histogram is a few thousand counts (ideally, ~7000 counts); the live DP should look better after doing this, too. DO NOT EXCEED ~10000 counts.



13. In “Camera Acquire” input an exposure time ~10 times the value used in “Camera View” to acquire a high resolution DP with count distribution similar to the live DP; immediately flip the viewing screen back down after acquisition.

14. If the rings in the DP appear dim or faint, increase “Gamma” under “Display Control” in Digital Micrograph so the rings are more evident.



15. If DP acquisition at a different camera length is needed, set the new camera length in “DIFF” mode and repeat the procedure starting from step 9.

16. When finished acquiring DPs, return to “MAG1” mode and set “SPOT SIZE” = 1; if regular TEM imaging is needed, the full alignment procedure will need to be performed again (particularly the gun tilt alignment).