

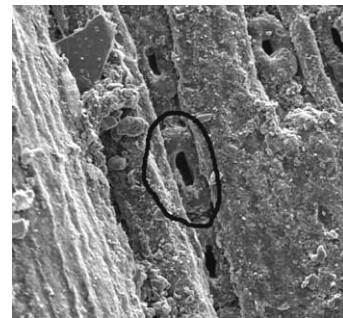
Colorization of SEM pictures using Adobe Photoshop®

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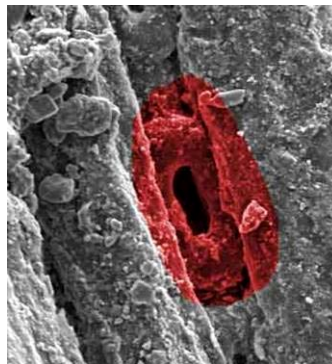
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1. Once pictures have been obtained from the SEM, open the desired photo in Photoshop
2. Go to Image on the toolbar, select Mode, and click RGB color.
3. If desired, go to Image again, click Adjustments, and then Auto Levels to automatically optimize the brightness and contrast.
4. Save the picture at this point (using the save as function and a new name so that the original picture is preserved) and frequently throughout the process, making sure to save with layers and not as a copy. Use the save as function to save a new file after any major changes are made, so that the files can be gone back to later if major mistakes or changes need to be made.

5. Decide which objects in the photo will be colorized; whether just a few bits or the entire photo. If you would like all or most of the image one color, go to step 11.
6. If doing just a few bits, use the lasso or square selection tool from the tool bar on the left and outline the section you wish to colorize, as in the picture on the right. Leave some room around the object, the excess will be removed later.



7. Right click the selection and select Layer via Copy
8. Go to Image → Adjustments → Hue/Saturation. Select the colorize box in the Hue/Saturation window that pops up and move the hue and saturation bars until the desired color is achieved. Write down the hue and saturation values if you want multiple objects that will all be the same color.



9. Select the eraser from the tool bar on the left and set the brush size at the top to a reasonable size and shape. Erase the extra material around the object, zooming in to progressively higher levels and using a progressively smaller eraser to remove the excess material. If you erase too much, just click back in the history window or click Step Backwards under the Edit menu.

10. Repeat the process for other objects in the photo.
11. If you wish to colorize the entire background, select the background layer in the Layers box, then go to Layer → New Adjustment Layer → Hue/Saturation..., click OK in the box that pops up, then select colorize in the Hue/Saturation window that appears, and adjust the hue and



saturation to the desired color. Only the background will change, the layers you have already colored will remain unchanged, as in the picture on the right.

12. To create an image in which small, colored objects show thought, as in the picture below, click the eye on the first hue adjustment layer in the Layers box. This will momentarily hide that layer. Then select the Background layer in the layers box and go to Layer→ New Adjustment Layer→ Hue/Saturation..., click OK in the box that pops up, then select colorize in the Hue/Saturation window that appears, and adjust the hue and saturation to the desired color.

13. Now click the eye on the first Hue adjustment layer and the layer will reappear.

14. Now, select the first Hue adjustment layer and use the eraser to remove it wherever you want the other color layer to show through. Continue with this until all the desired spots show through, as in the picture above.

15. The final quality of the image will depend on how long you want to spend on it, if the pictures won't be blown up much, satisfactory pictures can be produced in just a few minutes.

