Colouring X-ray Maps

Procedures for applying pseudo-colours to grayscale single-element image files (X-ray maps) obtained from mapping with an electron microprobe:

For maps acquired with the JEOL 8900R software:

Exporting the maps using JEOL Utility

Export the TIF files of the X-ray and BSE maps using the JEOL software:

Utility | Map File Converters | McGill Map to Tiff (Scale)

This will generate two Tagged Image Format files for each map, one without a scale bar (*.tif), and one with a scale bar (*S.tif). Copy these files from the B2000 computer.

Colouring of single images using ImageJ

Using the freeware program ImageJ, http://rsb.info.nih.gov/ij/ open a ***.tif** file or ***.jpg** as follows:

File | Open | *file name* **| Open**

Check the Type, and if necessary, convert it to 8-bit in ImageJ:

Image | Type | 8-bit

To convert it to a colour image using ImageJ:

Image | Lookup Tables | 16 Colors

- The result for an X-ray map should be very similar to the original colour map generated on the electron microprobe.

To save the final map as a ***.tif** or ***.jpg** file using ImageJ:

File | Save As | Tiff (or **Jpeg**)…

To manually adjust the contrast and brightness of the coloured image using ImageJ:

File | Open | ***file name*** **| Open**

Image | Adjust | Brightness/Contrast…

Automatically enhance contrast using ImageJ (http://rsbweb.nih.gov/ij/docs/guide/146-29.html)

Process | Enhance Contrast | *Saturated pixels:* **0.1** *%* **| ✓** *Normalize* **| OK**

- If the *Equalize Histogram* option is used, details may be considerably enhanced, but the colours may no longer correspond directly to the measured X-ray intensities.

Batch colouring of *.tif files using ImageJ

Copy a series of ***.tif** files to a new directory that has a simple name, such as **source**.

Create another directory that has a simple name, such as **target**. Note that the directory names and file path cannot have spaces, dashes or other non-alphabetic characters.

Open ImageJ, and run the conversion macro (**colorXray.macro**) as follows:

Plugins | Macros | Run… | *browse to find* **colorXray.macro | Open**

Select the Source directory.

Select the Target directory.

View the resulting ***.tif** files with a graphics program, e.g., IrfanView (www.irfanview.com).

Consider renaming each new ***.tif** file to reflect the element mapped and sample identifier.

The text of the colorXray.macro follows here for reference:

```
// EAS colourXray.macro v3.0
// This macro will try to process all files in a "source" folder
// and convert them into TIF format and store them in a "target"
folder.
// Note: The macro converts the files to 8-bit grayscale prior to
colouring.



dir1 = getDirectory("Choose Source Directory ");
dir2 = getDirectory("Choose Destination Directory ");
list = getFileList(dir1);
setBatchMode(true);
for (i=0; i<list.length; i++) {
   showProgress(i+1, list.length);
   filename = dir1 + list[i];

   run("Open...", "open="+dir1+list[i]+" image=[16-bit Unsigned]
offset=0 number=1 gap=0");
   run("8-bit");
   run("16 Colors");
   saveAs("Tiff", dir2+list[i]);
   close();
}
Dialog.create("Process done");
Dialog.addMessage(i+" files have been processed.\nYou can find the
converted files in:\n"+dir2);
Dialog.show();
```