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Coloring of SEM Image [V]

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1. Introduction

This application software can color an SEM image with 256 grayscale.

2. Functions

Opens a bitmap or tiff file.
Note: 8 bits grayscale bitmap, or 8/16 bits grayscale tiff image, with un-compressed format

Changes the color of the opened image by the simple coloring method.

Changes the color of the opened image by the RGB color method.

Changes the color of the opened image by the RGB curve method.

Changes the color of the opened image by the contrast/brightness method.

Changes the color of the opened image by the palette color method.

Copies the whole image to the Clipboard.

Copies the selected area of the image to the Clipboard.
Note: Press this button, and then move the mouse-cursor onto the displayed image.
A cross cursor appears on the displayed image. Then, press the left-button of the mouse and drag the mouse on the displayed image with holding the mouse left-button down. After the area selection, release the mouse button. The selected area has been automatically copied to the Clipboard.

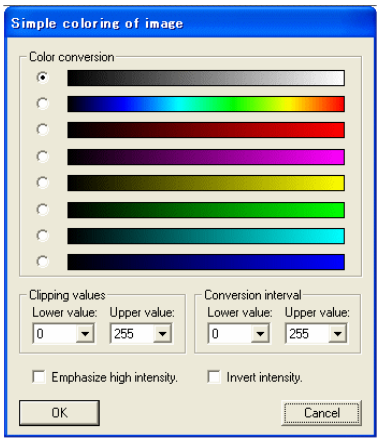
Saves the processed image with a filename.

Shows the version information.

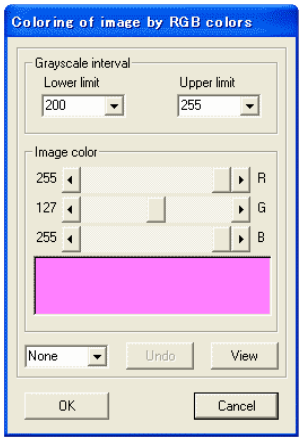
(This file.)

Closes this application software.

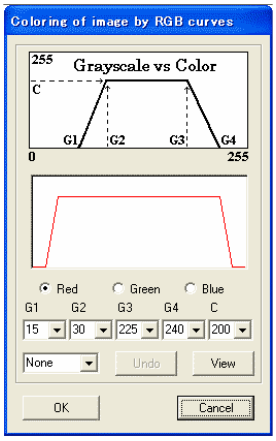
3. Setting dialog-boxes



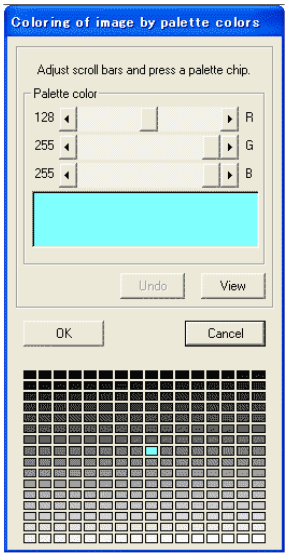
By  **button,**



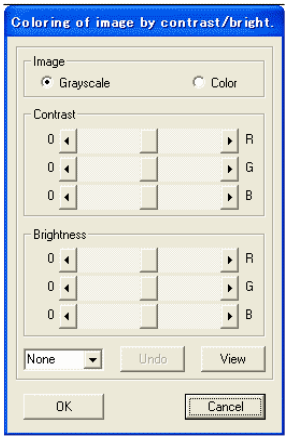
By  **button,**



By  **button,**



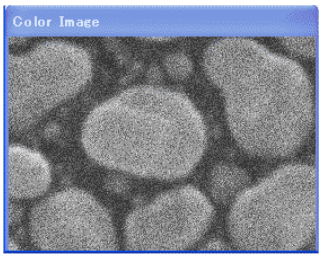
By  **button,**



By  **button,**

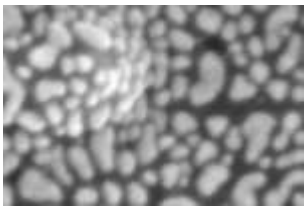
Image movement in the monitoring window:

When the coloring dialog being displayed, the monitoring window is displayed (except the "Simple coloring method"), in this case, the image area in the monitoring window can be selected by clicking the left-button of the mouse on the "image of main window."

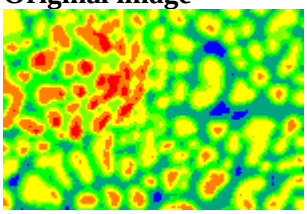


Regarding the color of the image on the monitoring window, the image color is determined only by the color values set by the RGB tools (RGB scroll-bars, RGB radio buttons, RGB combo-boxes, etc.) on the dialog-box (that is applied now.)

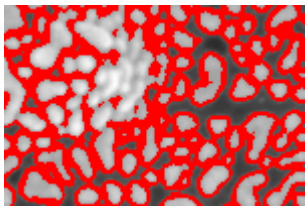
4. Examples of colored images



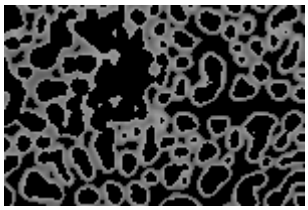
Original image



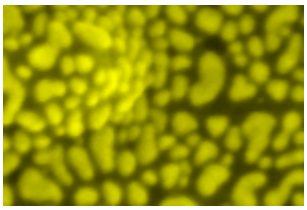
A1



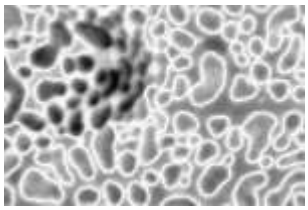
A2



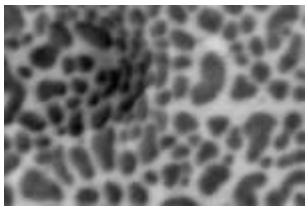
A3



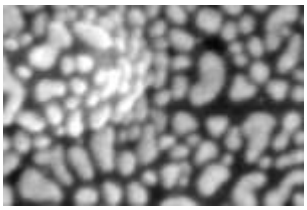
B1



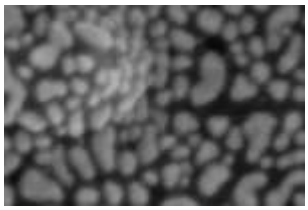
B2



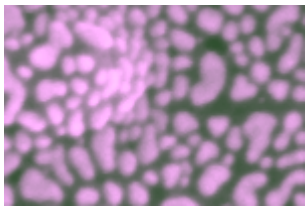
B3



C1



C2



C3

Coloring by grayscale intervals :

- **A1 : Divided grayscale intervals are colored.**
- **A2 : Medium grayscale interval is colored red.**
- **A3 : Other interval than medium grayscale is colored black.**

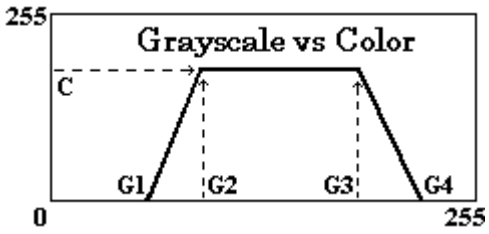
Coloring by RGB curves :

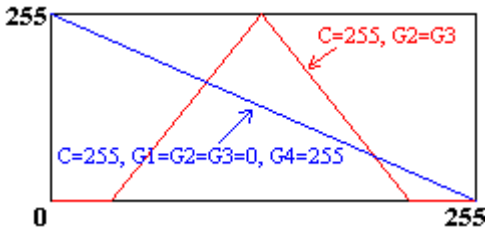
- **B1 : Grayscale is colored by R and G curves being set to linear, and B curve being set to zero.**
- **B2 : R, G, and B curves being set to triangle color grayscale.**
- **B3 : R, G, and B curves being set to anti-linear color grayscale.**

Coloring by contrast and brightness :

- **C1 : Contrast is uniformly increased.**
- **C2 : Brightness is uniformly decreased.**
- **C3 : Brightness of green color is decreased.**

5. Note for image coloring





An 8 bits bitmap or tiff (*) has a color palette with 256 RGB components.
Each component of the color palette has a set of (R, G, B) values, where R, G, and B are 0, 1, …, 255.
For example, in the case of an 8 bits grayscale bitmap or tiff, the array of the color palettes is basically (0, 0, 0), (1, 1, 1), …, and (255, 255, 255).

Therefore, the values of (R, G, B) can be arbitrarily changeable, if keeping the conditions of 0 <= R <= 255, 0 <= G <= 255, and 0 <= B <= 255. (Note: R, G, and B are integers.)

By changing (R, G, B) values, an 8 bits bitmap or tiff can be partially (or, fully) colored.

(*): Some 8 bits tiff file does not have an explicit color palette. But, there is a description (in the file) which indicates RGB order (white to black, or, black to white).

6. Remarks for the "Simple coloring method":

N: "color number" (to be modified) in the RGB components --- N = 0, 1, 2, …, 254, 255 ---
C1: lower clipping value (selected in the combo-box)
C2: upper clipping value (selected in the combo-box)
V1: lower conversion interval value (selected in the combo-box)
V2: upper conversion interval value (selected in the combo-box)

If $V1 \leq N \leq V2$, under this condition,
If C2 < N, D (= new N) = 255
If N < C1, D (= new N) = 0
If $C1 \leq N \leq C2$, D (= new N) = 255 * (N – C1) / (C2 – C1) [for normal mode]
D (= new N) = 255 * $(N – C1)^2$ / $(C2 – C1)^2$ [for high intensity (H.I.) mode]
Then, the "D" value is used as the "color number" in the selected color mode, so that a color image is generated. Please refer to the following picture showing the "color number N (N=0, 1, …, 255)".

[N = 0, 1, 2, …, 254, 255]

IF N < V1 or V2 < N, D (= new N) = "current N" [NO change to color]

7. 16 bits grayscale tiff files:

A 16 bits grayscale TIF does not have an explicit color palette (Note: There is a description in the TIF, that indicates RGB order --- white to black, or, black to white ---).
Therefore, the colored image (which has been created by a 16 bits grayscale TIF image) can be saved as an 8 bits TIF with color palette.

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