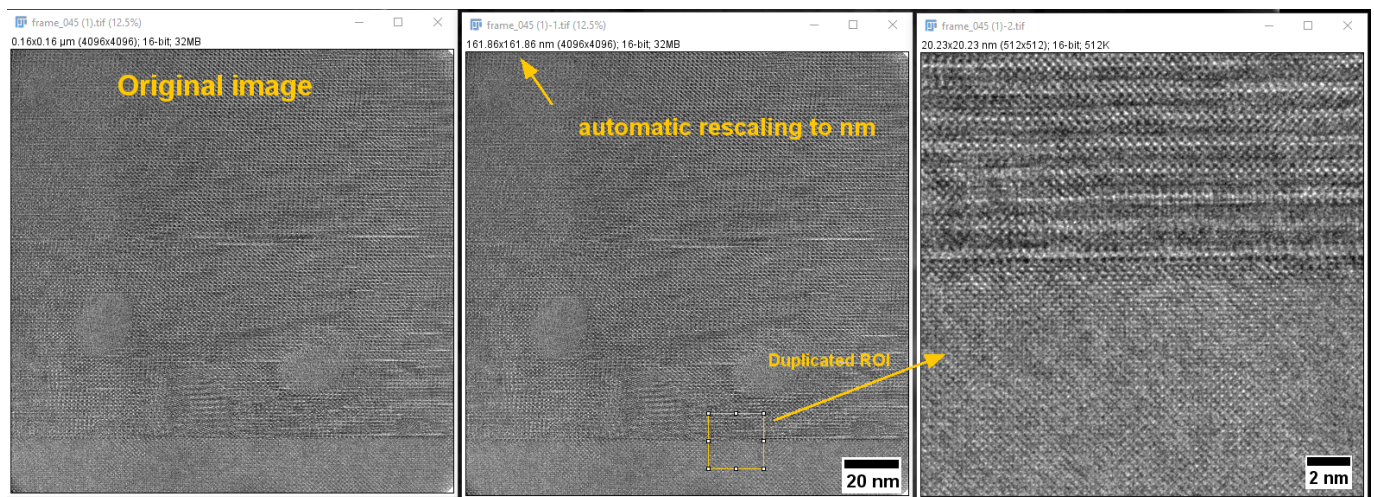


# em-scalebartools

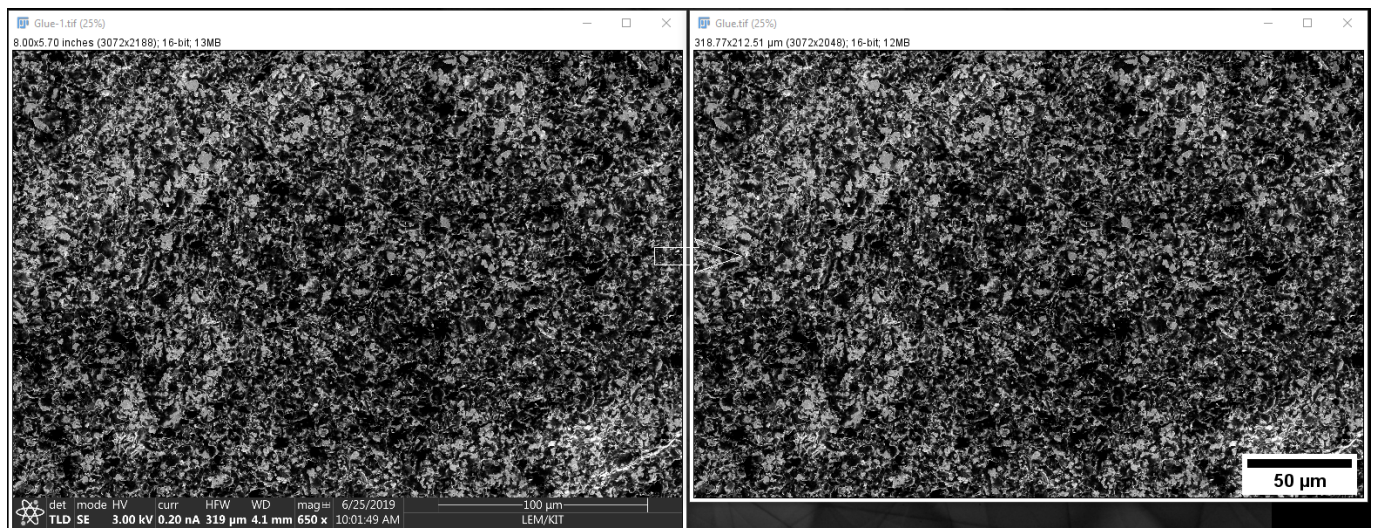
Fiji macro toolset to quickly add a scale bar with reasonable size to an image. Developed for electron microscopy.

## Examples

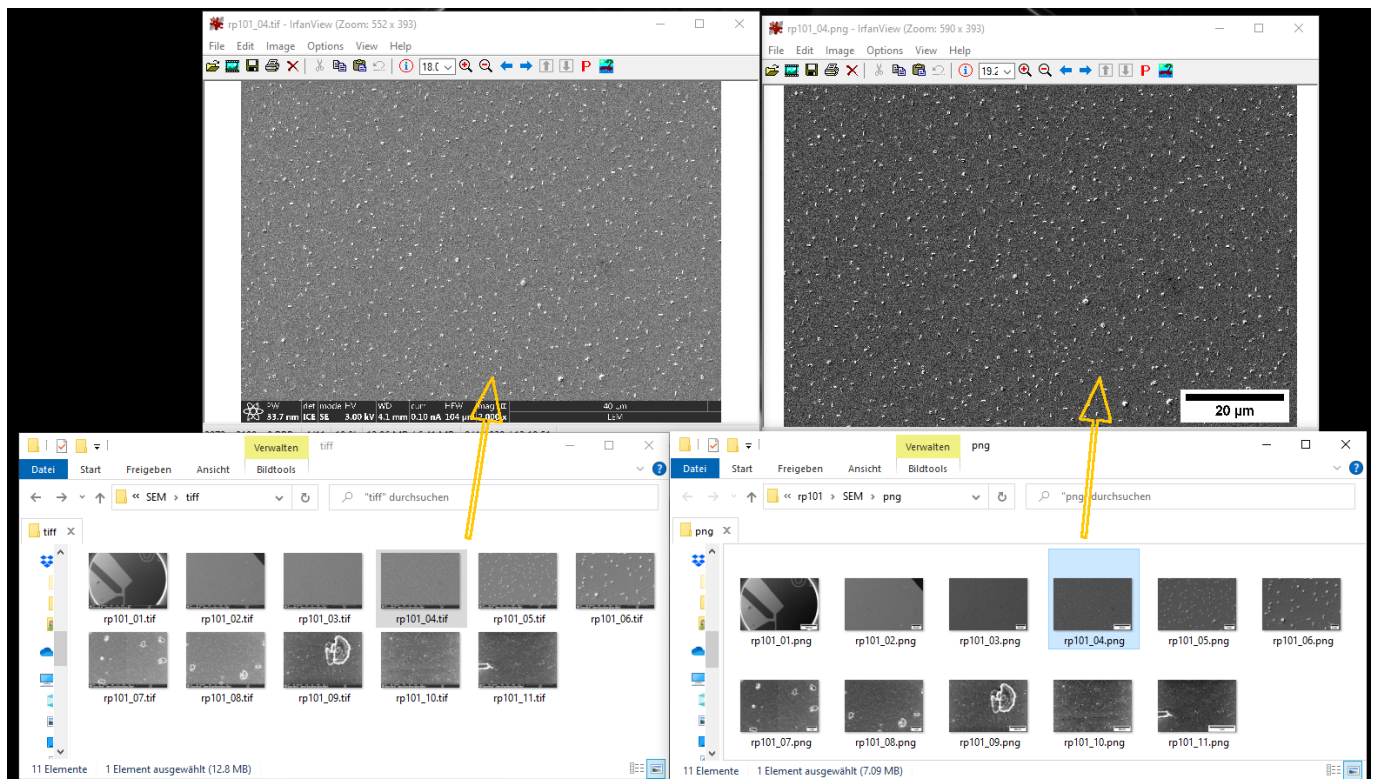
Using QuickScaleBar on a HRTEM image. Note the similar size of the scale bars for the  $4096^2$  image (center) and the cropped  $512^2$  ROI image (right).



Using FEI Crop Scalebar on an SEM image.



Batch conversion of SEM images ( Process -> Batch -> Macro... ) from tiff to png using `FEI_Crop_Scalebar.ijm`.



## Macro description

### QuickScaleBar Tool (Icon: SB)

- One-click action to add a scale bar to an image. Right click opens the options menu.
- The scale bar height and font size is adjusted based on image height (or width).
- The scale bar width is adjusted based on scaled image width (or height, or larger/smaller of the two) and rounded to next "good looking" number.
- The scale bar appearance can be set up just like the normal settings for `Analyze -> Tools -> Scale bar...`.
- Optional: Automatically switch units to make scale bar more appealing. E.g., an image with horizontal field width of 0.25  $\mu\text{m}$  will be switched to 250 nm. The scale bar will then also be in nm.
- Optional: Automatically re-scale image to (at least) a specified image size in pixels without interpolation (= nearest neighbor interpolation). This is convenient for programs like PowerPoint which like to automatically interpolate "small" images.
- Optional: Run custom macro commands provided in the options menu, e.g. `run('mp1-viridis');` to change LUT to viridis.



### FEI Crop Scalebar Tool (Icon: FEI)

- One-click action to crop away the databar from an FEI/TFS SEM/FIB image and to add a scale bar. Right click opens the options menu.
- Scale bar behaviour is the same as for QuickScaleBar tool and settings are taken from the QuickScaleBar options.
- Optional: Run custom macro commands provided in the options menu, e.g. `run('mpl-viridis');` to change LUT to viridis.
- Especially useful for batch conversion of SEM/FIB images (run from `Process -> Batch -> Macro...`): In the batch processing menu insert the macro command `runMacro('FEI_Crop_Scalebar.ijm');`.
- **Note:** The boundaries for the cropping area **depend on the microscope system type** because older FIB/SEMs use a nearly quadratic image format whereas modern microscope use landscape mode by default. You may need to adjust the microscope list once in the macro for your SEM, see instructions below.

### Move Overlays Tool (Circle icon)

- Move around scale bar for fine tuning of the position. Will anchor to special positions for easier alignment.
- Taken from: [Overlay Editing Tools](#)

### Remove Overlays Tool (x icon)

- Remove all overlays including the scale bar.

### About EMScaleBarTools (Icon: ?)

- Opens a short help dialog.

## Requirements and Installation

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- Requires the useful [EM tool](#) plugin by **IMBaIENCE** as FEI/TFS images are scaled with [SEM FEI metadata scale](#). Install via the Fiji update site.
- Download the latest [release](#), extract the `macros` folder, and copy it to your Fiji installation folder. It will add the `FEI_Crop_Scalebar.ijm` macro to the macros folder and the `EMScaleBarTools.ijm` toolset to the `macros/toolset` folder.
- Restart Fiji and select the `EMScaleBarTools` from `More Tools...` (>>) menu.

## Add a new microscope system type

Currently, only the system types `Helios G4 FX`, `Strata DB`, and `Quanta FEG` are implemented in `FEI Crop Scalebar`. You can add others in the following way:

- Open a SEM/FIB image of your FEI/TFS machine.
- Run `EM tool->SEM FEI metadata scale` and check the Log window for the system type:  
`[System] SystemType : ScopeName`
- For images of different size (e.g. 4096 by Y, 2048 by Y, 1024 by Y, ...) check the cut-off point (pixel) between the image and the databar (zoom in). Add a new `if` clause to the macro similar to the ones already in the macro (starting with `if(SystemType == ScopeName)`). E.g., for newer systems ( `Helios G4 FX` ) the cut-off is a power of two (512, 1024, ...) but for older scopes (such as `Strata DB` ) the values are more 'random' and you can simply specify a list with the cut-off values for different image sizes.

## A short code documentation

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Warning: Code is not optimized in any way, but should work (?). :-)

### QuickScaleBar Options

`Relative height` : Height of scale bar wrt image height in pixel (default: `0.02` , 2% of image height)

`Relative width` : Width of scale bar with respect to `Scalebar size reference` option (default: `0.2` , 20% of image width), will get rounded to next smaller "nice" value, see ( `vals` array in the code).

`Relative fontsize` : Font size wrt `Scalebar height` (default: `3` , point size of scale bar height).

`Scalebar color` : Font size color (default: `'Black'` ).

`Background color` : Background color (default: `'White'` ). Use `'None'` to remove background.

`Scalebar location` : Location/position of scale bar (default: `'Lower Right'` ).

`Bold` : Bold font (default: `true` ).

`Overlay` : Add scale bar as an overlay (default: `true` ).

`Serif font` : Serif font (default: `false` ).

`Hide` : Hide font, only plot scale bar (default: `false` ). Will create a copy of the image with the scale-bar length in the title.

`Scalebar size reference` : Base scale bar size on width/height/smaller/larger edge of the image (default: `'Larger'` ). You can adjust this for narrow images to modify scale bar appearance. Use `Height / Width` if you want to have identical scale bar sizes for images of same `Height / Width` .

`Auto unit-switching` : Automatically adjusts units between m and Angstrom based on `Check` and `U` values. (default: `true` ).

(`Auto unit-switching`) `Check` : Check width/height/both of image for unit switching (default: `'Width'` ).

`U` : Unit switching factor (default: `3` ). Example: Will switch from  $\mu\text{m}$  to nm if image width is below 3  $\mu\text{m}$ . Will switch from nm to  $\mu\text{m}$  if image width is larger than 3000 nm.

`Auto re-scale images` : If true/1, automatically rescale (using no interpolation/nearest interpolation) small image width or height to at least `rescale_target_px` value. (default: `0` , false). Useful to resize small cropped areas of larger images. This is the same as using `CTRL+E` and rescaling with `Interpolation: None` .

`rescale_target_px` : Target minimum pixel size for `auto_rescale` . (default: `512` )

`Run custom macro commands` : Run commands specified in next line (default: `false` ). In the `Custom macro commands` field, multiple commands must be separated by `;` .

### FEI Crop Scalebar Options

`Crop data bar` : Crop data bar of FEI/TFS image (default: `true` )

`Show metadata in log window` : Keep log window open or close it (default: `false` ).

`Run custom macro commands` : Run commands specified in next line (default: `false` ). In the `Custom macro commands` field, multiple commands must be separated by `;` .

## Other useful scalebar tools

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- Python: [matplotlib-scalebar](#) by ppinard
- DM/GMS: [Scale Bar Control](#) by D. R. G. Mitchell
- Fiji/ImageJ: [asc-ImageJ-Fancy-Labels](#) by peterjlee
- Fiji/ImageJ: [Scale Bar Tools for Microscopes](#) by Gilles Carpentier

# Changelog

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## v0.2

- Renamed `ScaleBarTools.ijm` to `EMScaleBarTools.ijm` because there is also a plugin by [Gilles Carpentier](#) with a similar name. Makes it clear that is meant for EM.
- Reorganization of the code: `QuickScaleBar.ijm` was merged into `EMScaleBarTools.ijm`. `FEI_Crop_Scalebar.ijm` is still a stand-alone macro for easier use with batch processing.
- Included option menus for some icon tools, which can be accessed by right-click. More convenient editing than in the source code.
- Options parameters are stored internally in java variables and saved for future sessions (`ij.get` and `ij.set` calls). I took inspiration from another toolsets macro: [Roi 1-click tools](#)
- Added more options for scale bar appearance (serif font, bold, hide, ...).
- Added two additional tools in the menu: Move Overlays and Remove Overlays for quick manipulation of the scale bar (which is often an overlay).