Image acquisition and processing software

ISCapture

Instruction Manual

- Key to the Instruction Manual
  - IS is shortened name used for ISCapture.
- Help
  - Refer to [Help] >> [About ISCapture] menu for software information and technical support.
  - Provide the following information when it is required to obtain the technical support:

① Camera model and S/N (serial number);

② Software version number;

③ Description of the problem. Screenshots of the problem would be useful.

System requirements

OS	Windows XP/ Vista/ 7/ 8 (32 & 64bit)
CPU	Intel processor (Core2 Duo or higher is recommended)
Memory	2GB or More is recommended
USB ports	USB2.0 Hi-Speed port

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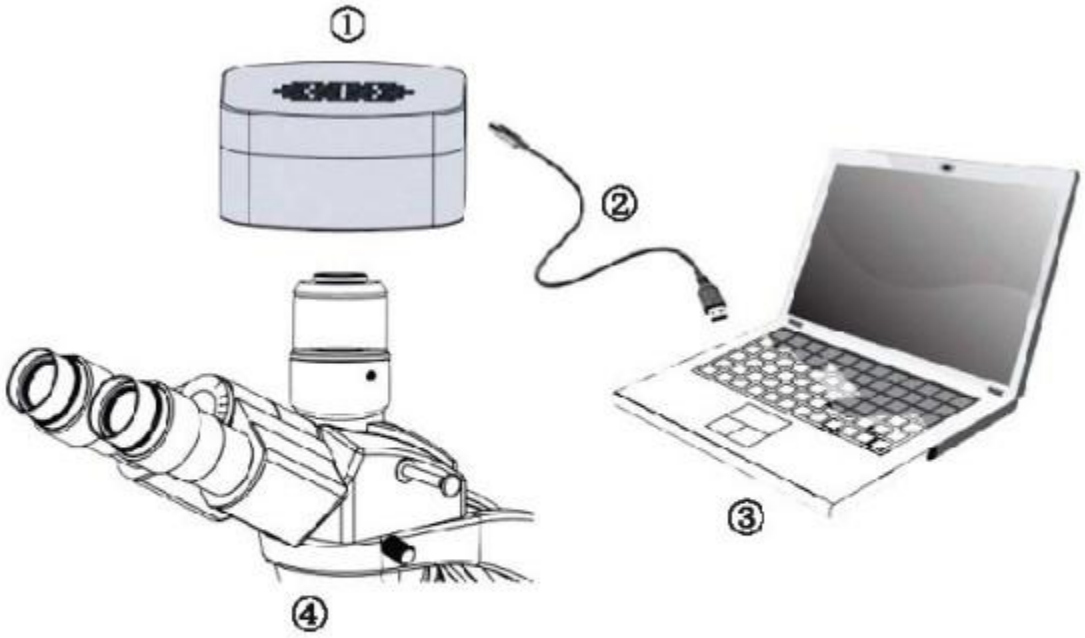
Chapter1: Quick Start

Camera Installation



① Camera ② USB Cable

③ PC ④ Microscope or Lens

Software and Driver Installation

Driver Installation

1. Connect the camera to the PC. Insert the CD comes with the camera, copy the driver “Camera Driver (H Series) Setup.exe” to the computer. Double click on it to start the installation. Follow the [Next] button to finish the installation.

2. Go to the Device Manager and check whether the driver is installed properly. If there is **NO YELLOW FLAG** with the camera under Imaging Device in Device Manager, the driver is installed successfully (see Figure 1).

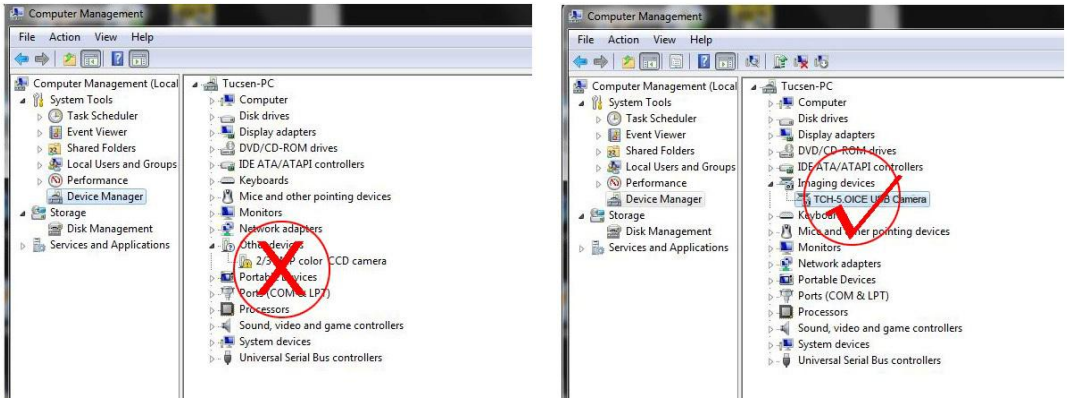


Figure 1

Software Installation

1. Copy the software ISCapture installer to the PC. Double-click on it to start the installation. Follow the [Next] button to finish the installation.

2. After finish the installation, a software shortcut will be created on the desktop.

Note: If previous version ISCapture was installed in your PC, the installer will automatically detect it and ask to remove it first before install the new one.
If the previous installed ISCapture is still running, it will ask to close the software and then start the installation.

Start ISCapture

1. Connect the camera to the PC. Be sure the driver is already installed properly.

2. Double-click the ISCapture shortcut “IS” to start the software.

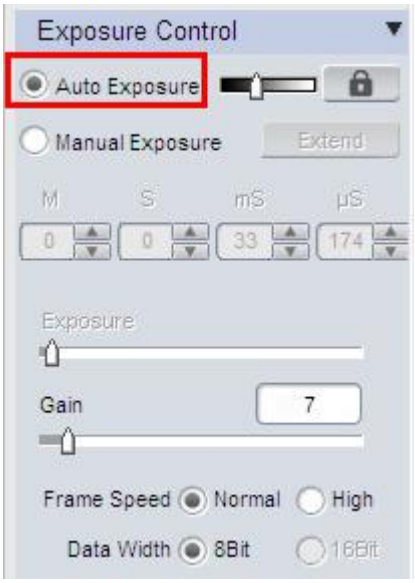
3. Software will automatically detect the device and start the preview.

If get the “No Camera” or “Initialization Failed” error, it could be the camera is not detected by the PC or the driver is not installed properly. Please go to Device Manager to check the camera driver installation status.

ISCapture Parameter Settings

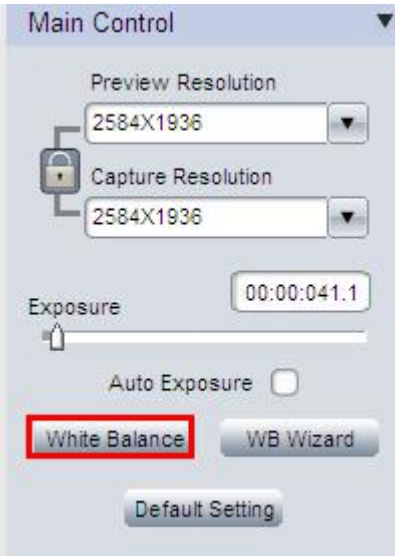
1. Set **Auto Exposure**. Observe the preview and adjust the microscope (or lens) to make image in focus.

Normally Auto Exposure function can get proper brightness preview. If preview is still dark, manually set **Gain** to the middle of the slider.



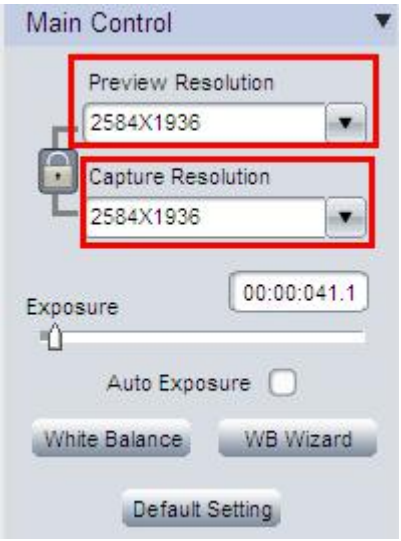
When get preview in focus, set **Gain** back to the initial value, change to **Manual Exposure** mode and extend the exposure time manually until get proper brightness images.

2. Click **White Balance** button to correct image color.



To get better white balance result, please move the sample to the blank area and then hit **White Balance** button, then move back the sample. Or also can click **WB Wizard** and follow the steps to finish the white balance.

3. Change resolution to preview and capture different resolution images.

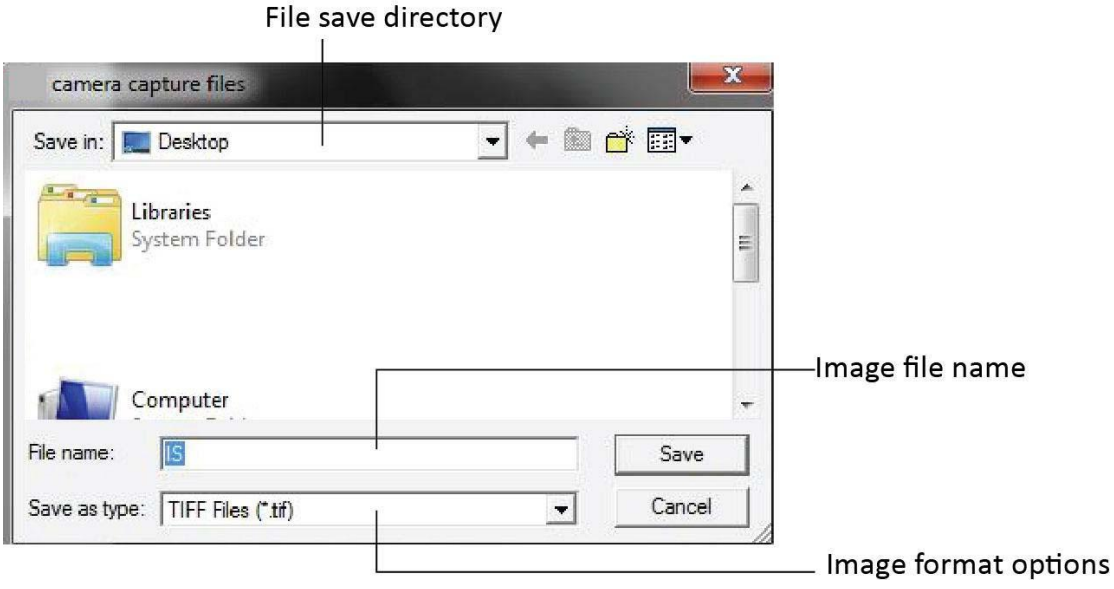


Click the Lock tag to lock/unlock the preview and capture resolution. Unlocking it allows to set different preview and capture resolution (Usually use for low resolution preview, high resolution for capture).

4. Go to **File Save** tab to set image save format, directory and file name.

a. Select **Use File Save Config** to pre-set the capture image format, save directory and file name.

b. Select **Use File Save Dialog** to use pop up dialog to set capture image file name, save directory and format.



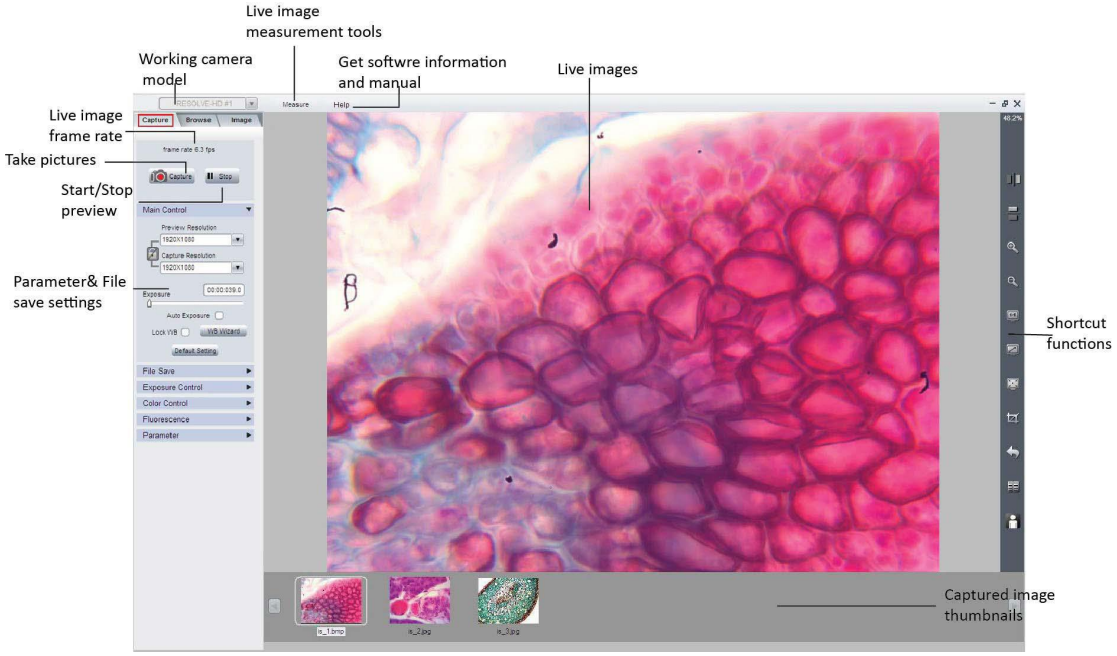
Every time click Capture button

, the file save dialog will pop up every time to ask to set file name, save directory and image format.

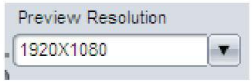
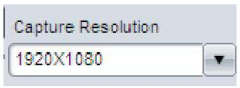
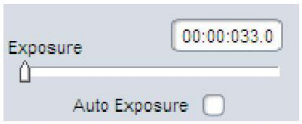
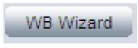
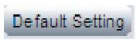
Chapter2: Image Acquisition

Adjust camera parameter settings to get proper live image; live image measurement and save still pictures and videos.

.



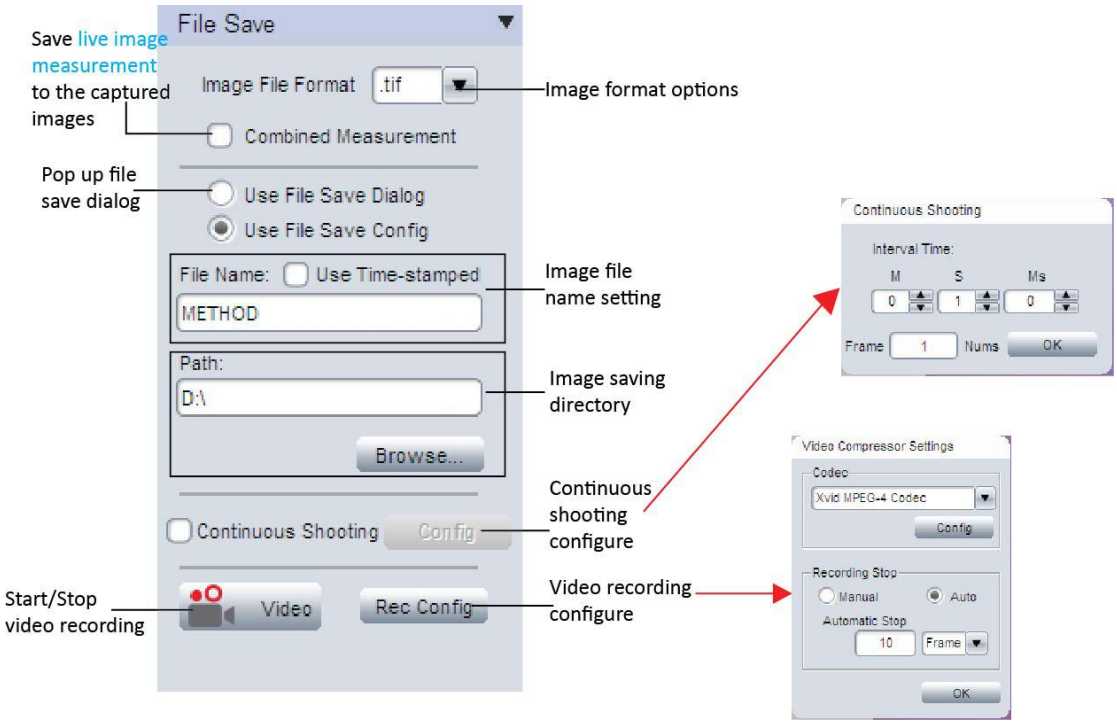
Basic Control

	Live image resolution	Select resolution for live image
	Captured image resolution	Select resolution for capturing
	Exposure Time	Change Exposure time to adjust image brightness. Auto Exposure mode will adjust proper brightness image automatically.
	Lock White Balance	Unchecked: Auto White Balance mode. Apply white balance calculation for every frame image. Checked: Lock the White Balance calculation result.
	White Balance Wizard	Wizard for getting better White Balance result.
	Default settings	Restore all the parameters to default value

After setting the brightness live image, it is recommended to apply White Balance to correct the live image color. To get better white balance effects, please follow the following steps:

1. Move the sample to the blank area;
2. Uncheck [Lock WB];
3. When see image in correct color, check [Lock WB] check box;
4. Move the sample back.

Taking Still Images and Videos

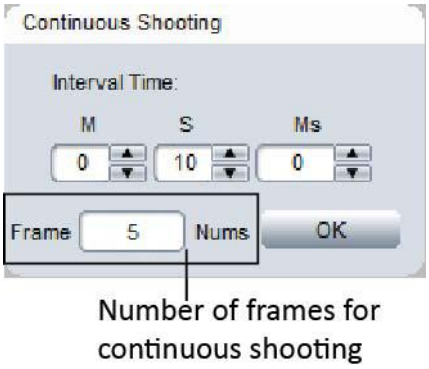


- In the [File format] dropdown menu , 4 file formats are available: JPEG, BMP, TIFF and RAW.

Raw image file contains minimally processed data from the camera. It needs to be read in some special software for example Photoshop, ImagJ etc. If it is the color camera raw file, color information only can be seen after decoding the Bayer matrix

Continuous Shooting

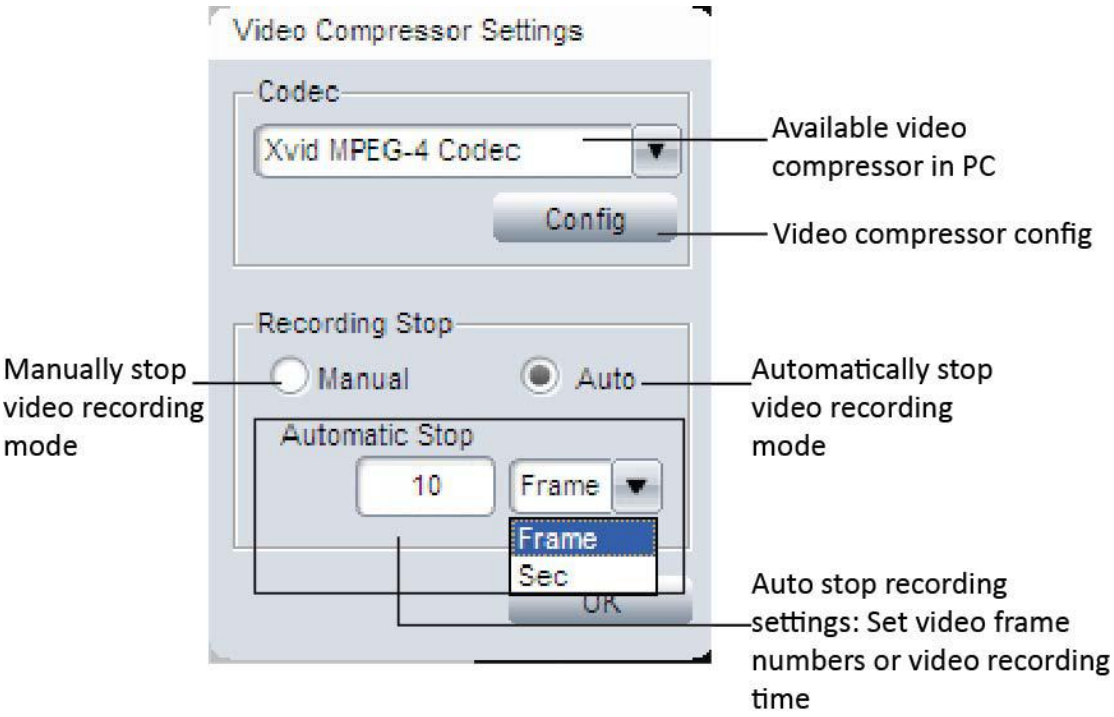
- Click [Continuous Shooting] checkbox Continuous Shooting, the software will automatically save a set of images after a single [Capture] is executed.
- Click [Config] to set continuous capturing image numbers and the interval time .



Video recording

Click [Video] / , start/ stop video recording.

Click [Rec Config] to get video recording configure window.



It provides [Manual] and [Auto] modes to stop the recording.

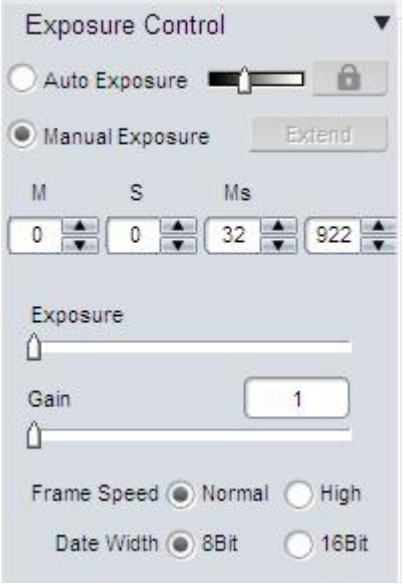
- [Manual] mode, [Video] button is pushed to start and stop the recording.
- [Auto] mode, pre-set the number of frames or the time for videos

and [Video] is pushed, IS will stop the recording automatically after save pre-set number of frames or pre-set time is up.

- [Rec Config]>>[Codec] will also list all the available video compressors on the PC.

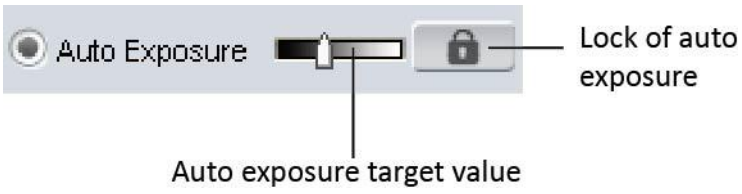
The video taken without any compression will be very large size. IS Will automatically search the installed video compressors installed on the PC.

Exposure Control



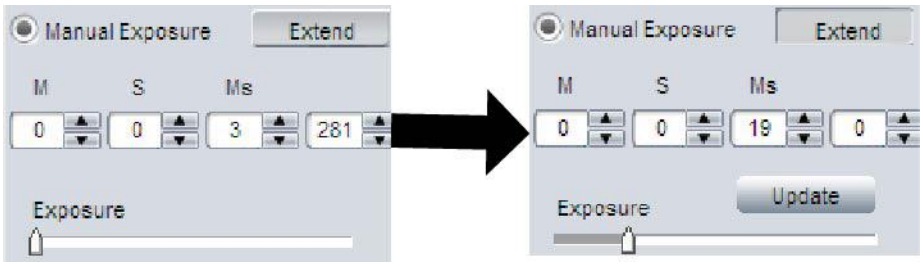
Change the Exposure time, Gain to adjust the image brightness. Select frame speed to get different live image frame rate. Set 8-bit or 16-bit data width for captured images.

Auto Exposure



- Check [Auto Exposure] checkbox, software start to adjust the exposure time automatically to get proper brightness of live image.
- Auto exposure target value: Set the reference exposure time for auto exposure adjustment.
- Lock: will stop the auto exposure calculation.

Manual Exposure



Adjust the exposure time manually.

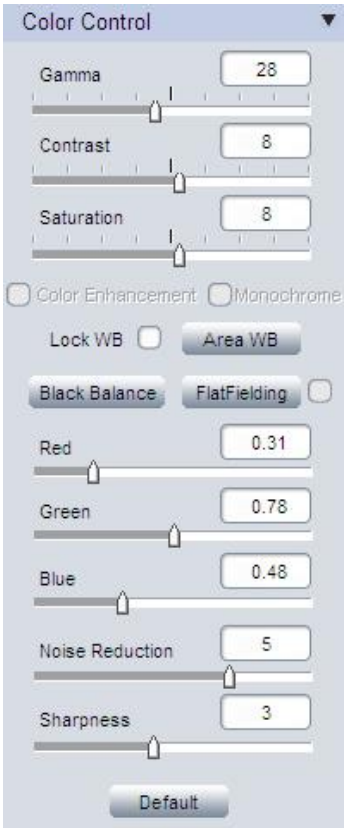
[Extend] Extend is used to get longer exposure time. This function is ONLY available for CCD cameras. For other cameras especially the CMOS camera, the maximum exposure time is shorter than 1 second, then [Extend] will be gray out.

[Update] Update appears after [Extend] is selected. Click on it to stop the previous exposure time and restart the new one immediately. For long exposure applications, we strongly recommend that [Update] is used to start a new setting. This will help to get the new exposed image earlier. If the exposure time is less than 2-3 seconds, it is not necessary to use it.

Gain, Frame Speed & Data Width

Gain		Increase the power of the image data. Higher gain gives brighter images, but also makes the noise signal more obvious.
Frame Speed	High Speed	Corresponding to high pixel clock. Gives faster frame rate.
	Normal Speed	Offer lower frame rate than High Speed, but gives longer maximum exposure time.
Data Width	8-bit	8-bit images use 2^8 = 256 gray levels to represent image details.
	16-bit	16-bit images use 2^16 gray levels to represent image details. ONLY available for CCD & Discovery series cameras in .Tiff and .Raw formats.

Color Control



Flat Fielding Function

Flat fielding function is used to correct the uneven background brightness.

- Click on [FlatFielding]

to start the flat fielding parameter calculation and apply it to the live images.
- When the check box

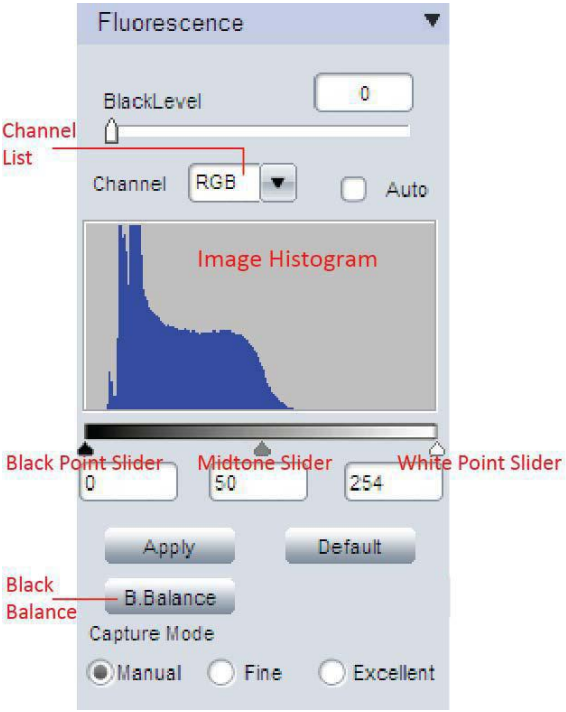
is unchecked, the calculated flat fielding parameter is NOT applied to the live images.

To get better flat fielding result, Move the sample to a blank area first, apply the flat fielding, then move the sample back.

When the lighting is changed, re-do the [FlatFielding] to correct the uneven brightness.

Gamma	Gamma is used to obtain correct reproduction of intensity. Default value (Gamma = 0) is recommended in most of cases.
Contrast	Contrast is the difference between the brightness brights and the darkest darks in an image. Higher contrast will make the shadows become darker and the highlights brighter. High contrast will lost more image details. Default value (Contrast = 0) is recommended.
Saturation	Adjust image saturation. Saturation is the intensity of color in the image.
Color Enhancement	Used to make the image color more vivid. Before doing White Balance, it recommends to uncheck this function, then apply WB. Not Available for TrueChrome II
Monochrome	Check the checkbox to get a grayscale image.
Lock WB	Lock White balance. When get good color preview, check the checkbox to lock the good white balance paremeters for the coming images.
Area WB	Manually select the white color area in the image as the white balance reference
Black Balance	Black Balance. Correct black color. Usually use in fluorescence application. Not Available for TrueChrome II
FlatFielding	Correct image uneven brightness. Uncheck the check box: cancle background brightness correction.
Red	Adjust the intensity of red in the image. [Red] = 1 means the original intensity of red in the image.
Green	Adjust the intensity of green in the image. [Green] = 1 means the original intensity of green in the image.
Blue	Adjust the intensity of Blue in the image. [Blue] = 1 means the original intensity of blue in the image.
Denoise	**Reduce image noise, improve image quality.** ONLY Available for TrueChrome II
Sharpness	**Used to get sharper images.** ONLY Available for TrueChrome II
Default	Restore the parameter settings to the initial value and apply white balance.

Fluorescence Settings



Included in our software are useful parameter settings for fluorescence or low light imaging. It helps to get better images easier and faster.

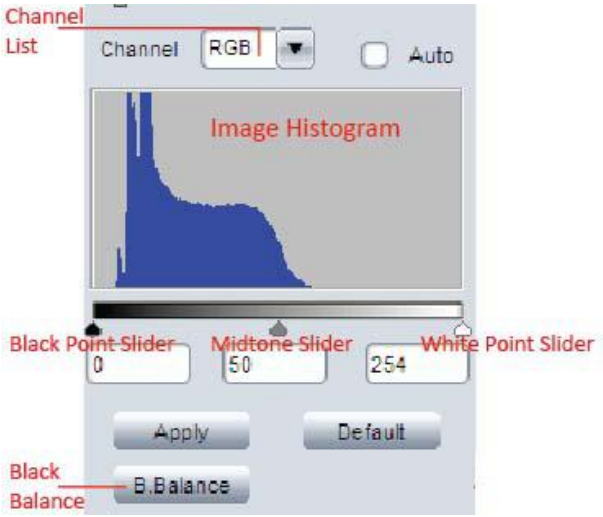
Black Level

Black level function defines the brightness level at the darkest part of the image. In low light imaging, it helps to see more details in the dark area.

In low light application, it usually needs quite a long exposure time to get proper images. If you set a long exposure time at the beginning, you might need quite a long time to find your target and get a proper image (wait for finishing a long exposure to get a new frame image, adjust, wait...). When searching for the imaging target at the beginning, we recommend to set a shorter exposure time, but make larger Gain and

Black level first. After you find the target, then reduce the Gain and Black level, and increase the exposure time. This will aid in a better image acquisition.

Levels



The levels tool can move and stretch brightness levels in a histogram using three main components: a black point, white point and midtone slider.

Channel List: This allows to choose whether to edit RGB channel or one of the three, individual, color channels (Red, Green and Blue).

[Auto] checkbox: Adjust the live image levels automatically.

Manual adjustments of image levels.

Move the White Point Slider towards left, it is able to reveal some information in dark area. If move Black Point Slider towards right, it will reveal bright area information.

After adjusting the levels, click Apply to confirm the setting. If you need to go back to the original image, click Default to restore the image.

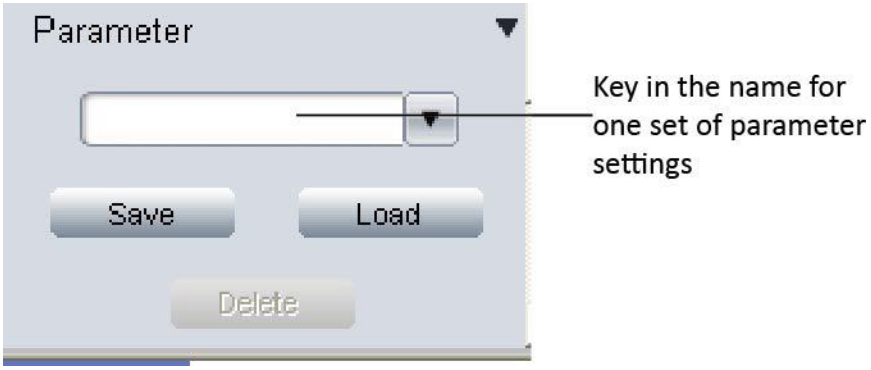
[Black Balance]: Gives camera a reference to “true black”. ONLY needed in dark field imaging.

Capture Mode

Three capture modes are specially developed for fluorescence imaging.

Manual	Capture the image with current parameter settings
Fine	Automatically reduce the gain and extend the exposure to get the same brightness image. (Lower gain will give lower noise level images)
Excellent	Automatically save 10 images with current settings and then get an average image. (It needs to take a while to capture an image in this mode.)

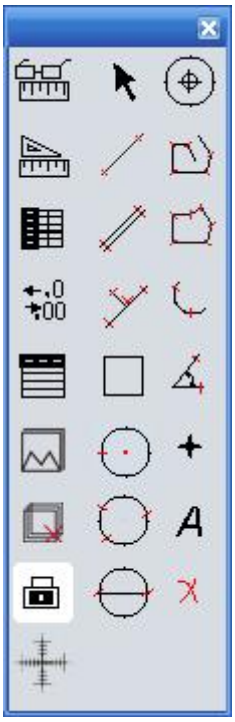
Parameter Group



Save parameter sets for different applications. The saved parameters include exposure time, gain, frame speed, data width, gamma, contrast, saturation, color enhancement status, monochrome, RGB gain and black level. It allows users to save 20 set parameters.

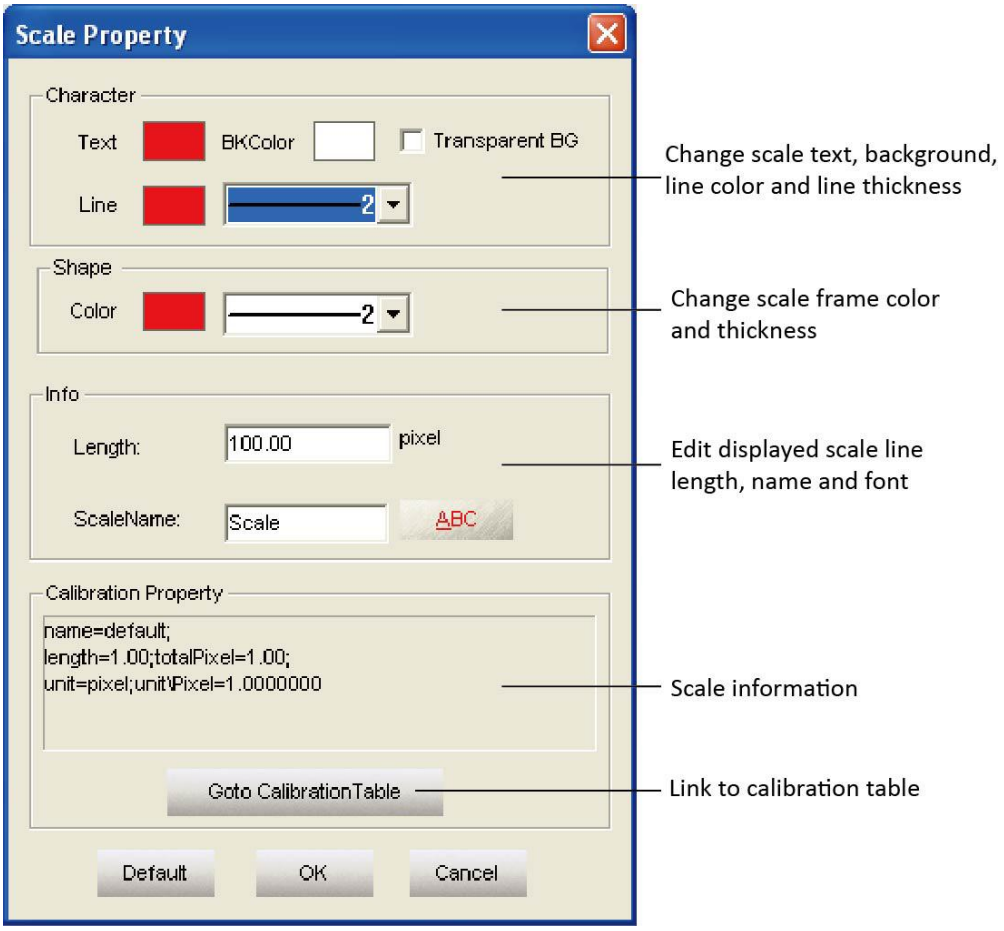
Chapter 3: Live & Still Image Measurement

Click on [Measure] at the top of the IS to get the measurement tools



	Show Scale Line	On/off the scale line on the picture
	Calibrate	Create Calibration file
	Calibrate Table	Available calibration file list. Allow to add, edit and delete calibration file.
	Decimal	Set measurement precision. Allowed decimal range is from 0 to 7
	Measurement List	List all the measurement data
	Layer	Create multiple layers to apply measurements and save layer information
	Delete All	Delete all the measurements and layers
	UnLock/Lock	Unlock/lock the measurement operation. Allow to do same measurement continually when LOCKED. It is locked by DEFAULT.
	Select	Select to change measurement or the measurement data position
	Line	Measure the length
	Parallel	Measure the distance of parallel. Allow to do multiple parallels' distance measurement. Double clicking to end parallel measurement.
	Perpendicular	Measure the perpendicular length. Allow to do multiple perpendiculars' length measurement. Double clicking to end perpendicular measurement.
	Rectangle	Measure rectangle height, width, area and perimeter.
	2−points Circle	Use center point and point on the circle to draw a circle. Give the radius, area and perimeter of circle
	3−points Circle	Use 3 points on the circle to draw a circle. Give the radius, area and perimeter of circle
	Diameter Circle	Draw a circle according to the diameter. Give the radius, area and perimeter of circle
	Concentric Circle	Use center point and radius to draw concentric circles. Give concentric circles' radius, area and perimeter. Allow to do multiple concentric circles measurement. Double clicking to end concentric circles measurement
	Polyline	Measure polyline length.
	Polygon	Measure polygon area and perimeter.
	Arc	Measure a curve angle, radius and length.
	Angle	Measure the angle
	Count	Counter. Manually count the quantity.
	Annotate	Add remarks on the images.
	Delete	Delete previous measurement. Select it then click on the measurement to delete the measurement.
	Cross−ruler	On or off cross-ruler on the images. The unit of the ruler depends on the applied calibration file.

Edit Scale Line

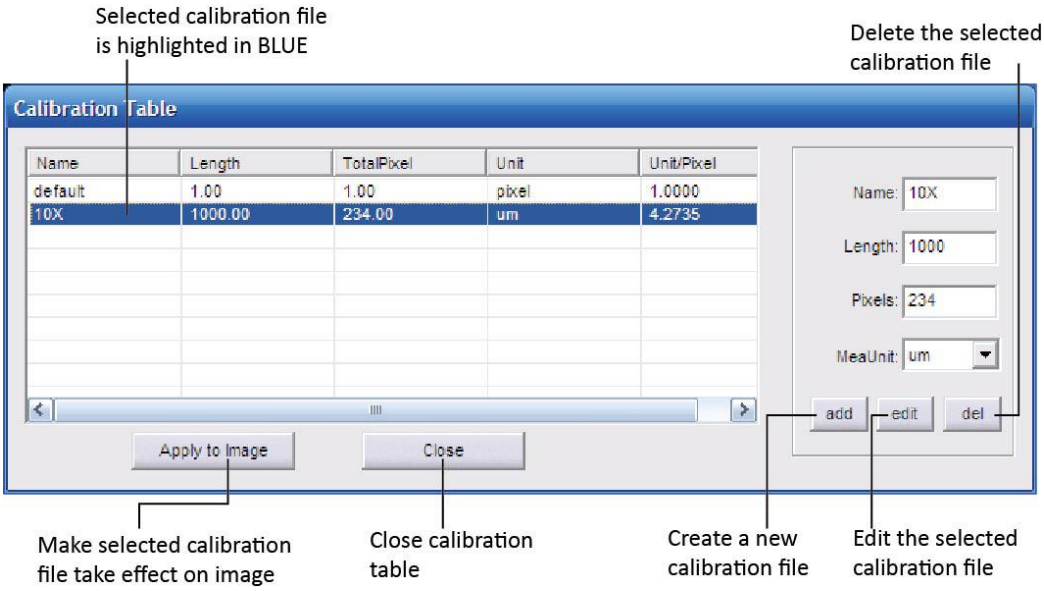


Double click on the scale to get its properties and make changes to it.

Create Calibration File

To measure the samples real size, the corresponding calibration file needs to be created first. Please check Appendix 1 to get more details about calibration.

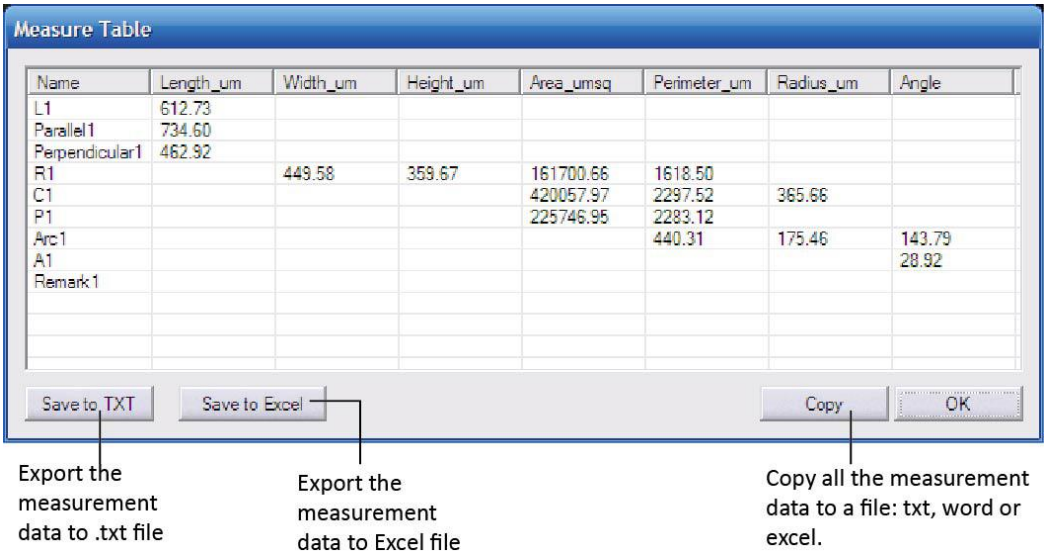
Calibration Table



- Click [Calibrate Table] to open the calibration table.
- Select the correct calibration file for current image measurement.

Using the WRONG calibration file will make the measurement result inaccurate. Please make sure the calibration file is correctly corresponding to the current image. Hence, it is useful to name the calibration file with the capturing settings or objective name.

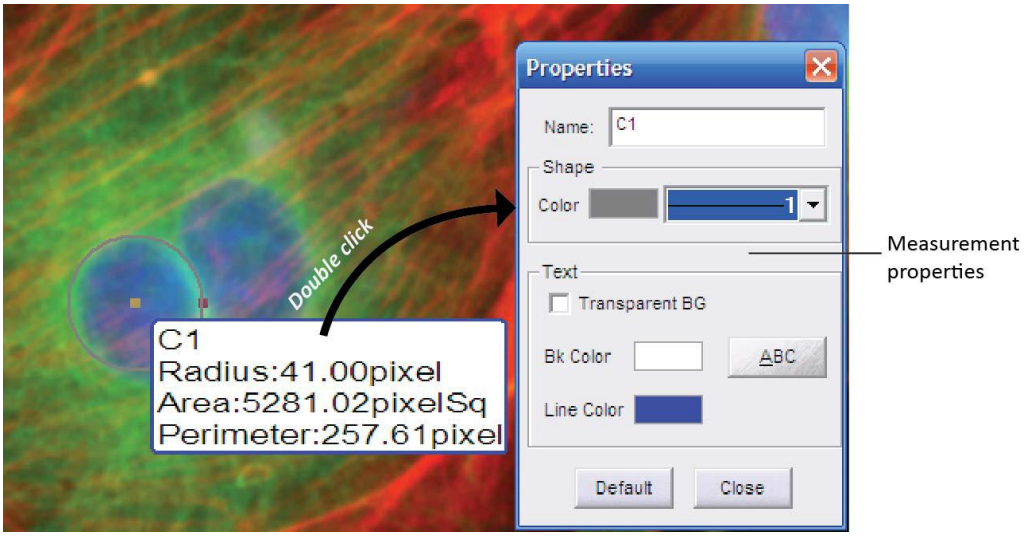
Measurement List



All the measurement data is listed in the [Measurement List]. The software allows you to export the measurement data to TXT or Excel file.

Measurement

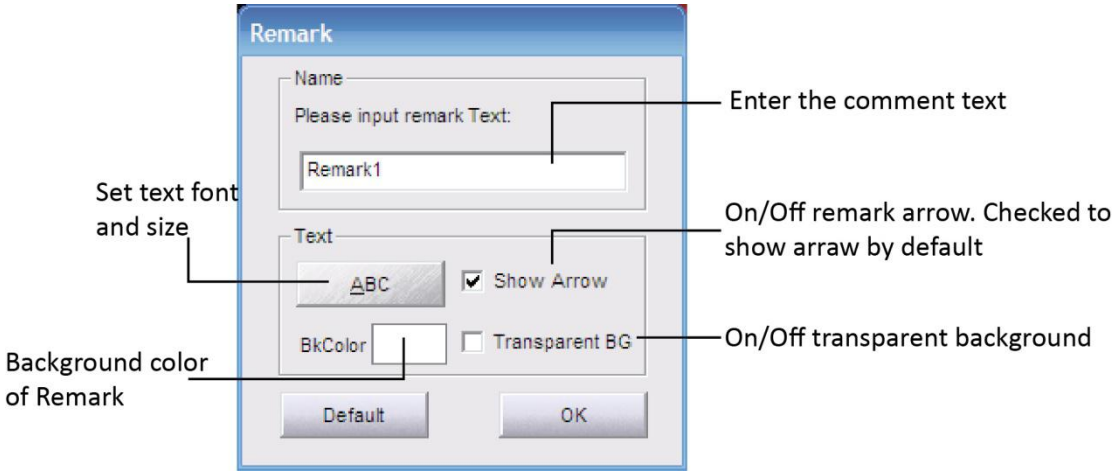
IS allows you to do line, parallel, perpendicular, rectangle, circle, polygon, arc and angle measurement. The [Count] function allows you to manually count the objects. And the [Annotate] function offers to add comments on the images.



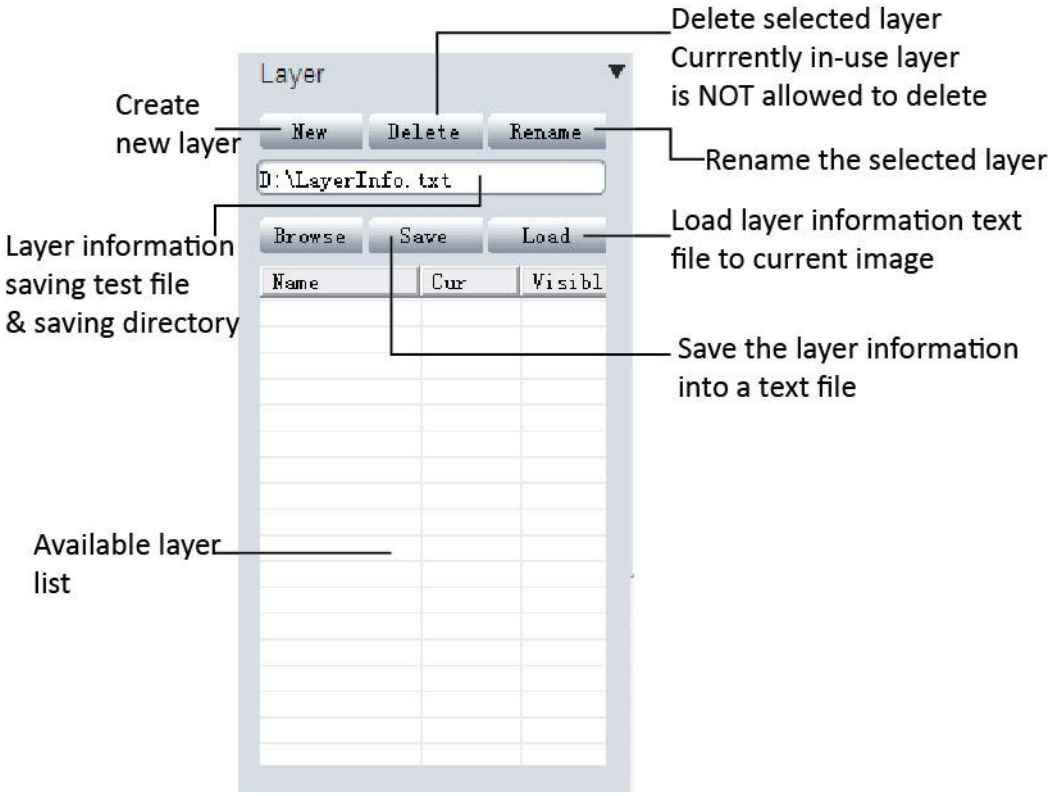
Double click on the measure data to get the measurement configure window. It allows you to change the measured data name, color, thickness, background color and the character font.

Annotate

Select [Annotate] and click on the image area which you prefer to add a remark.



Layer

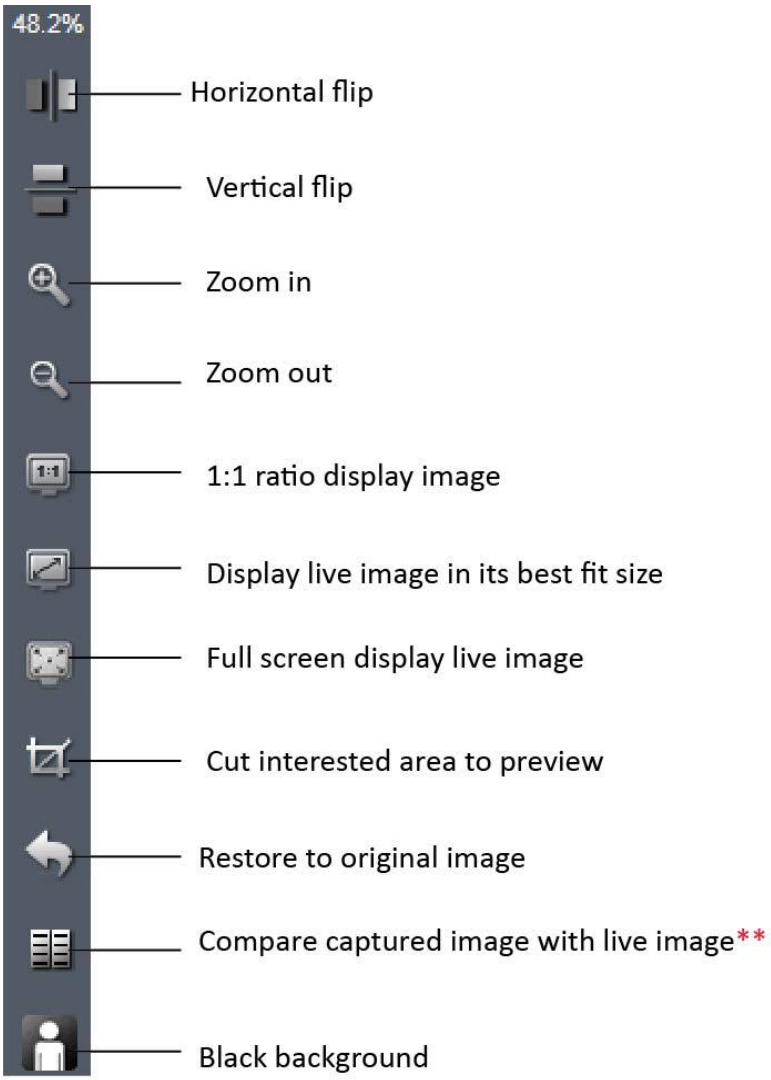


When need to apply mass measurement on the images, some different measurements would be overlaid which make the measurement much difficult. The layer function allows to create multiple layers to do

different measurement which will make adding a large number of measurements on the processed image review simple and easy. Go to Appendix 2 to get more details.

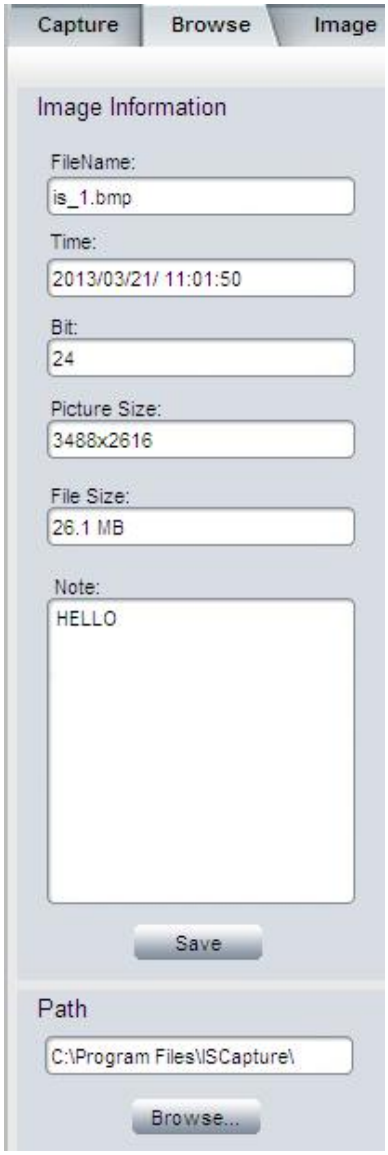
Live image shortcut

On the right hand side of the live image window, some shortcuts are provided to process the live image quickly.



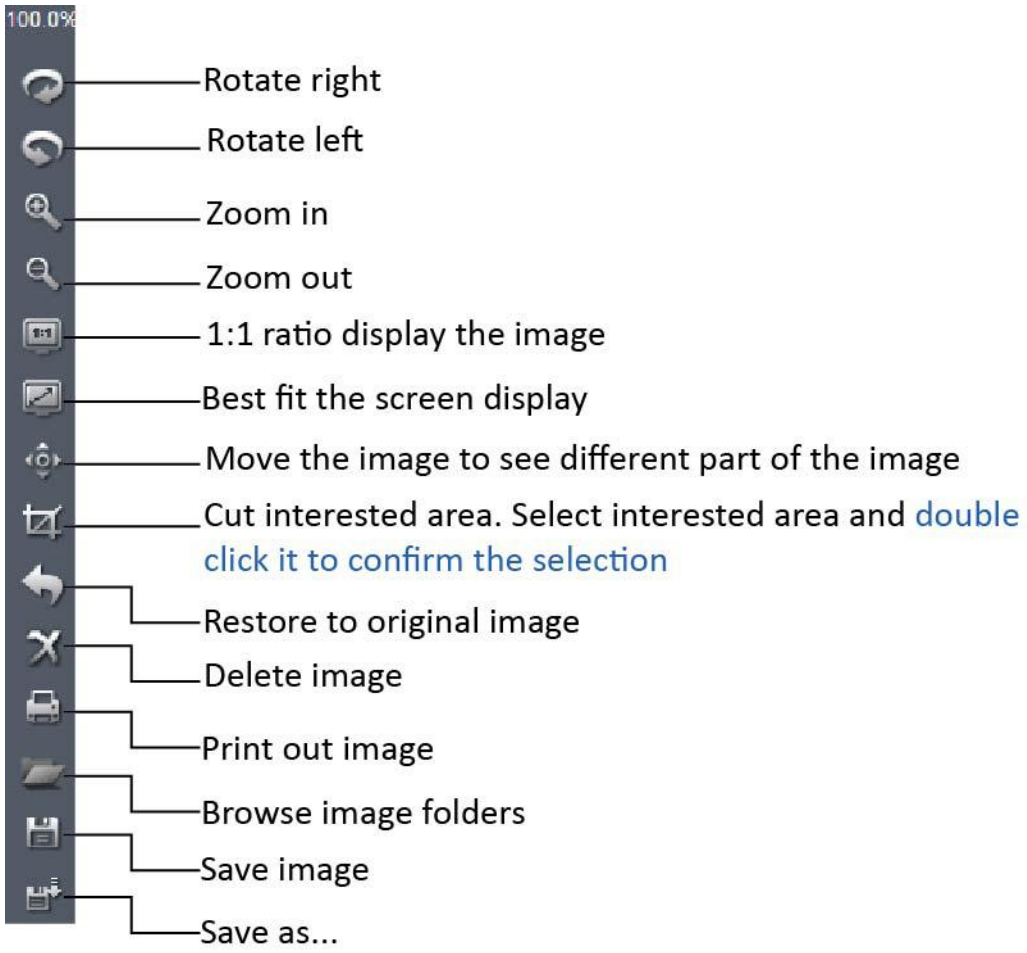
** Compare function: Live image will be displayed on the left side. Click on the taken image thumbnail to select it to compare with live images (Chosen compared image will be enhanced in gray-white frame).

Chapter4: Image management



View images in [Browse] panel, it displays the image File name, capturing time, color depth (bit), picture resolution and image size. It also allows you to add comments to any individual image. When you view this image next time in the IS, it will show the image comment.

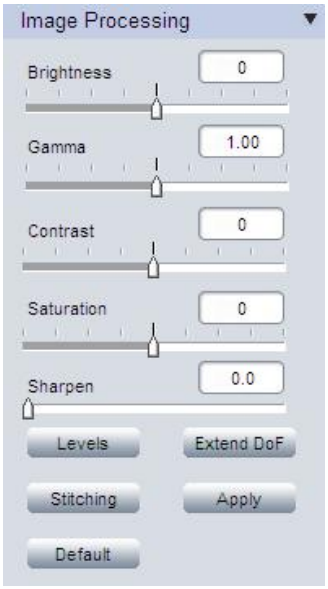
IS provides some quick functions on the right hand side of the software in ***Browse*** or ***Image*** mode.



Chapter4: Image Processing

In this section, IS provides advanced image processing functions and also allows you to do the measurement on the still images.

Image Processing



Provide basic captured image processing functions and allows additional advanced functions such as extended Depth of Focus and image stitching.

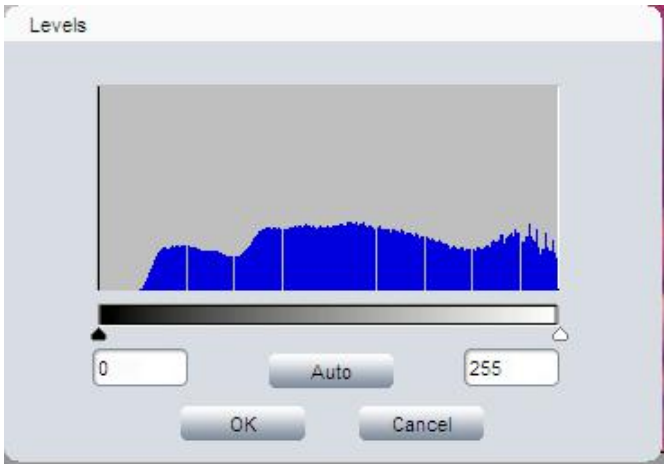
Brightness	Adjust captured image brightness. Default brightness = 0
Gamma	Adjust captured image gamma. Default gamma = 1.00
Contrast	Adjust contrast. Increase the contrast, the shadows become darker and the highlights brighter. Decrease the contrast, the highlights grow dim and the dark areas lighten up
Saturation	Adjust the color saturation. Fully-saturated colors are very bright, while low saturation are grayish.
Sharpen	Adjust the image sharpness. Sharpness is the contrast on the edges. Sharpening increases the bright and dark lines on edges.
Levels	Adjust image levels. Get more details in [Fluorescence]>>[Levels]
Extend DoF	Extend the Depth of Focus (DoF)
Stitching	Image stitching. Combine multiple images with overlapping fields of view to produce a segmented panorama or high-resolution image.
Default	Restore Brightness, Gamma, Saturation, Sharpen and levels back to the default value
Apply	Confirm to apply all the settings to the image.

After clicking [Apply], all the settings are applied to the image. NOTE: Once you choose this you can NOT revert to the original image.

Level

Push [Levels]

to get the image histogram. It allows you to adjust the image levels. The level adjustment is the same as live image level adjustment. Get more detail in [Capture]-->> [Fluorescence].



Extend depth of focus

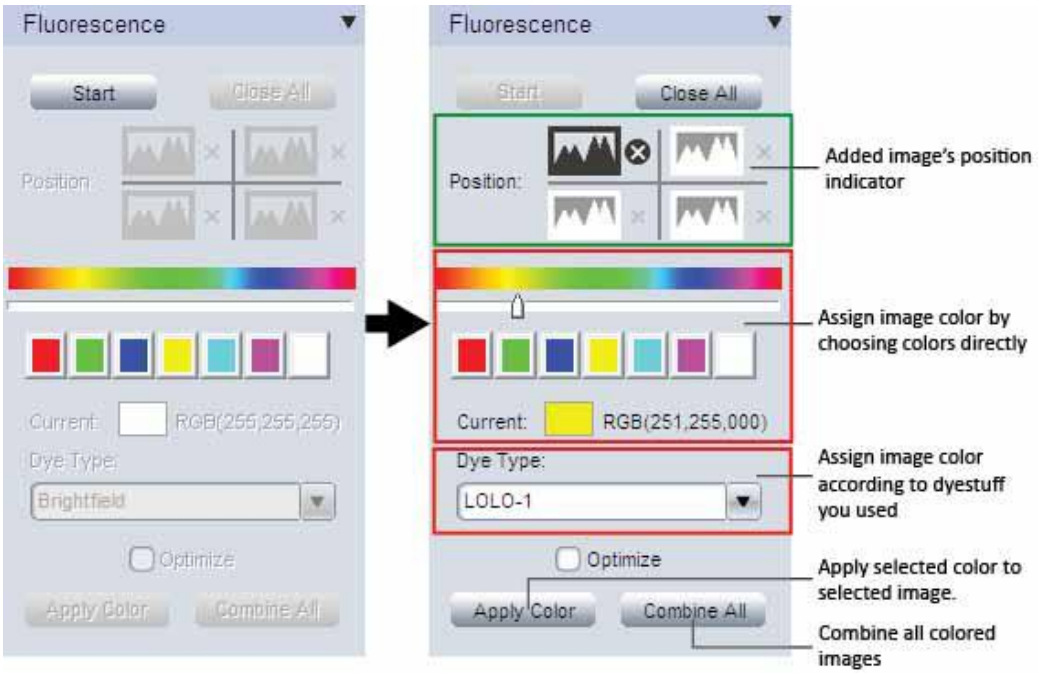
Extend depth of focus functions combines multiple images to create one focused image. It is used to extend a picture's apparent depth of field. Go to Appendix 3: Advanced Functions to get more details.

Image stitching

Click on

to get the image stitching configuration. It combines multiple images with overlapping fields of view to produce a large panorama or high-resolution image. Go to Appendix 3: Advanced Functions to get more details.

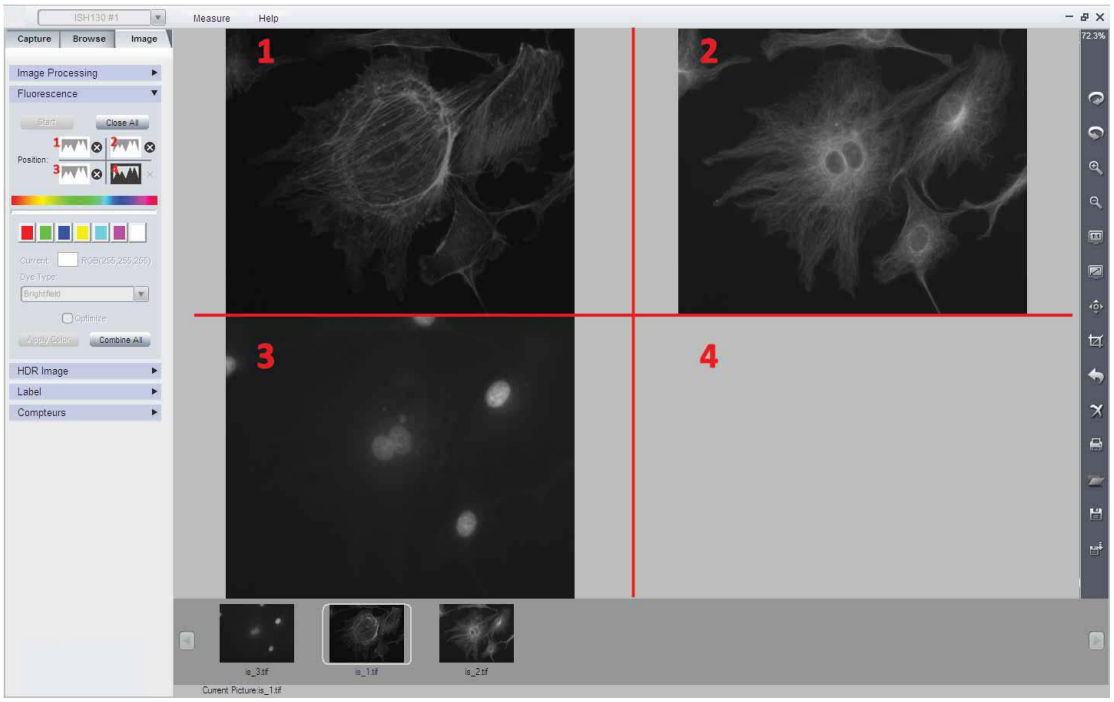
Fluorescence



This function is used to assign Black & White fluorescence images with different colors and combine them together into one image.

Step 1: Open the images which are used for combination in IS , then click on [Start] to start the fluorescence combination.

Step 2: Click on image thumbnails to add corresponding images. The image position indicator shows the added images' position. Maximum 4 frame images are allowed to add for fluorescence combination.



Step 3: Click on one added image indicator to start applying color for it.

① Click on one image indicator to select it (The selected one will be in dark color, unselected ones will be gray white).

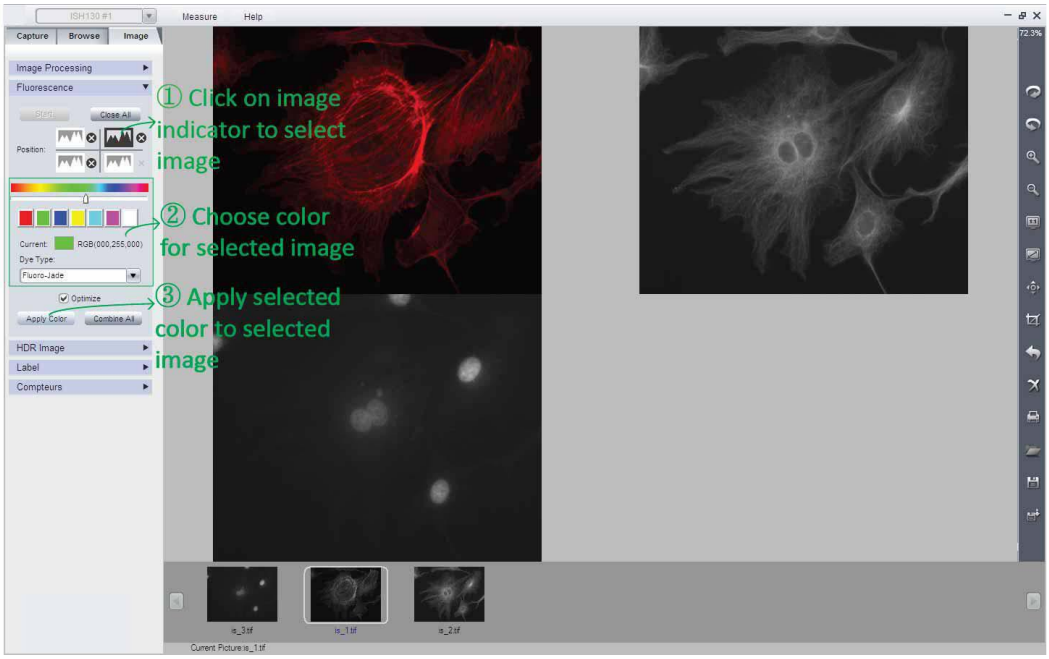
② Assign color for selected image.

Two ways provided for color assignment:

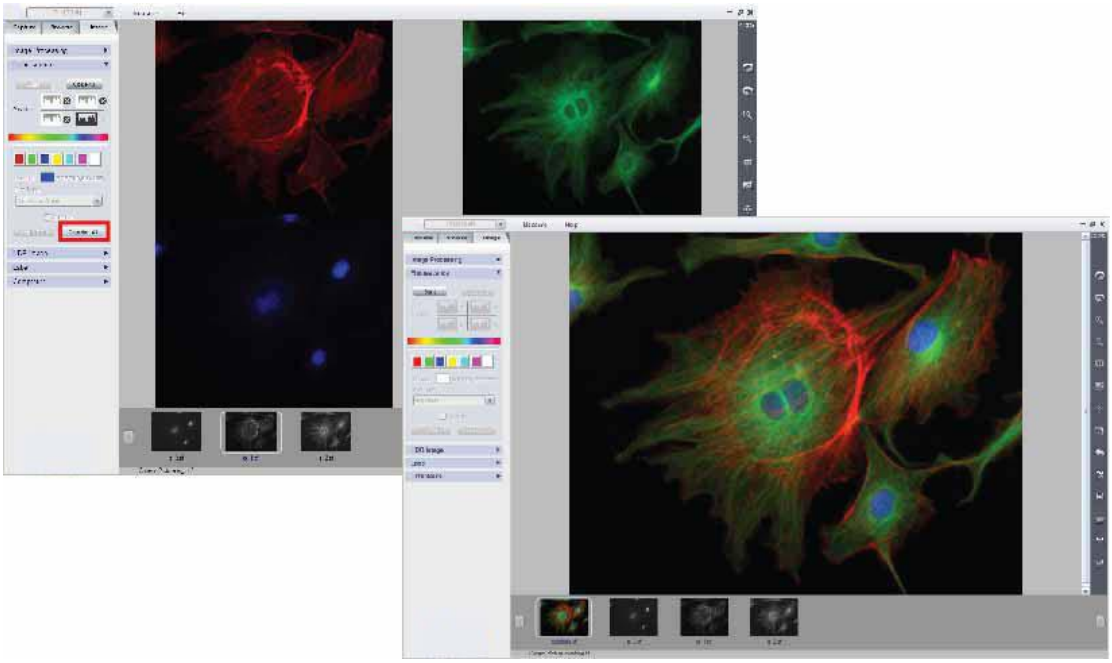
a. Click on the preferred color or slider to choose it.

b. Assign the color according to the fluorescence dye in the drop-down menu [Dye Type].

③ Click on [Apply Color] button to add selected color on the image.



Step 4: Click on [Combine All] to combine all the colored images.



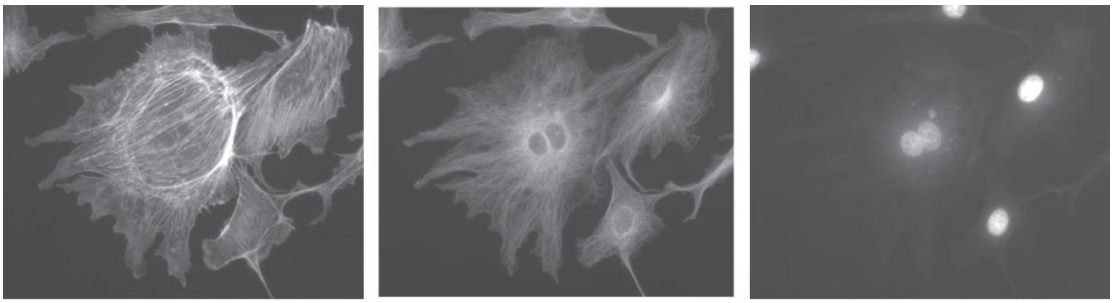
Optimize checkbox is recommended to select during the combination. It will optimize image background to get a better image. If the optimize function is not selected, the created image will keep all the original information. No extra processing is applied to the image data.

After combining the fluorescence image,

[Sharp] function in [Image Processing] can help to get sharper images and see more image details.

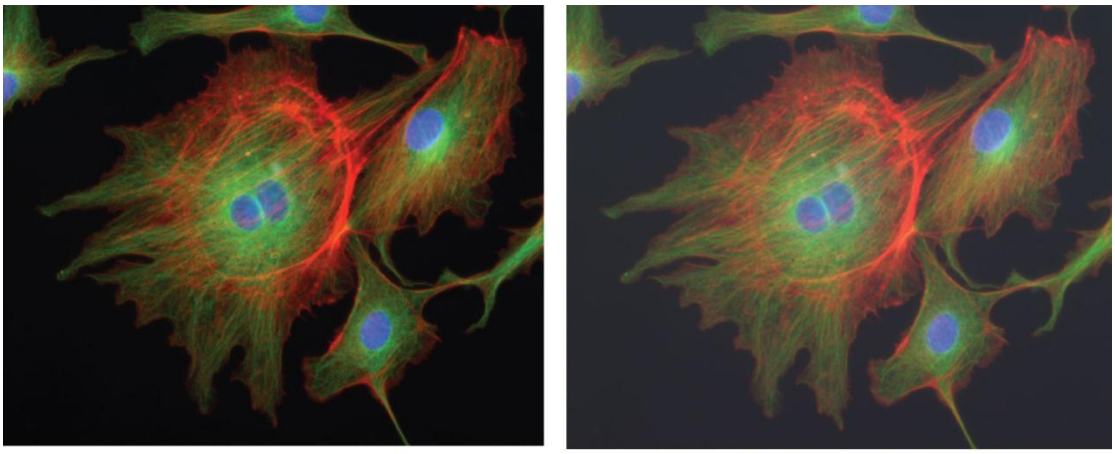
If you add the wrong image or wrong color to selected image, just click on the tiny cross beside each indicator to delete it. If you want to cancel the current combination, just click on [Close All] to cancel the combination.

Original images:



Original images

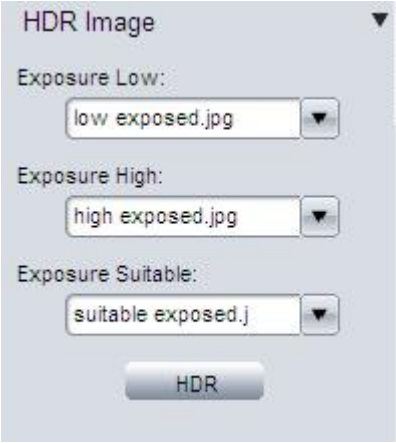
Combined image:



Combined image with optimization

Combined image without optimization

HDR Image

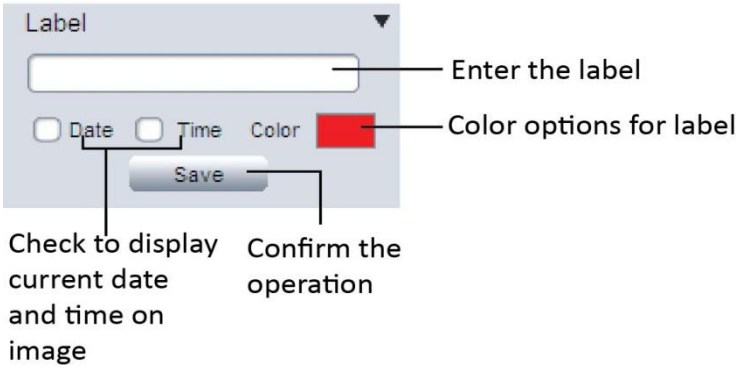


High Dynamic Range (HDR) image is used to get greater dynamic range of an image.

- Take pictures for one same scene with different exposure time and load them in the software.
- In the drop-down menu, select corresponding images for [Exposure Low], [Exposure High] and [Exposure Suitable].
- Push [HDR] button to combine different exposed images into one. The generated HDR image will be named as “hdr_image”.

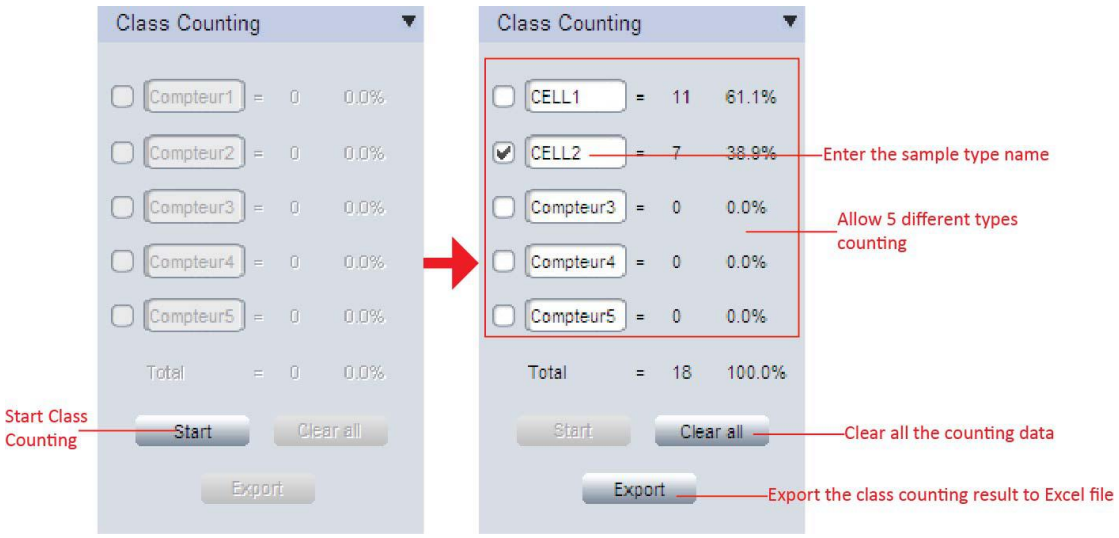
If the different exposed images are not loaded in the ISCapture yet, the shortcut on the right hand side of the ISCapture allows you to browse any image simply.

Label

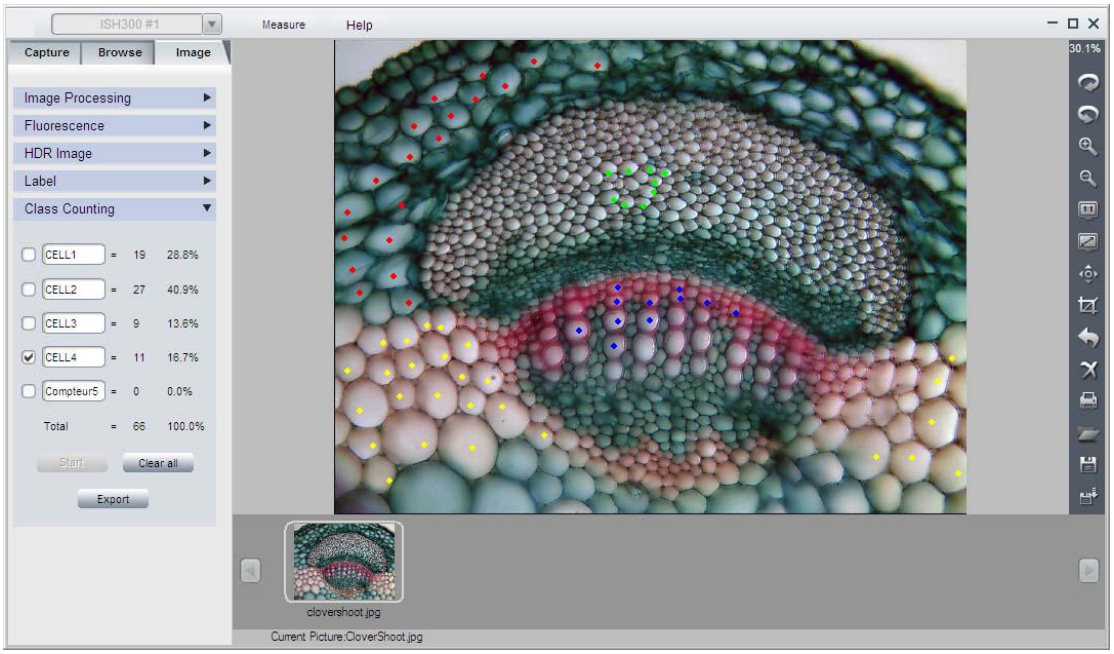


Add label text and the date and time on the the image. Click [Save] to save the labels.

Class Counting



Class counting function allows to do 5 different types samples counting manually. Each type will be assigned with different color dots.

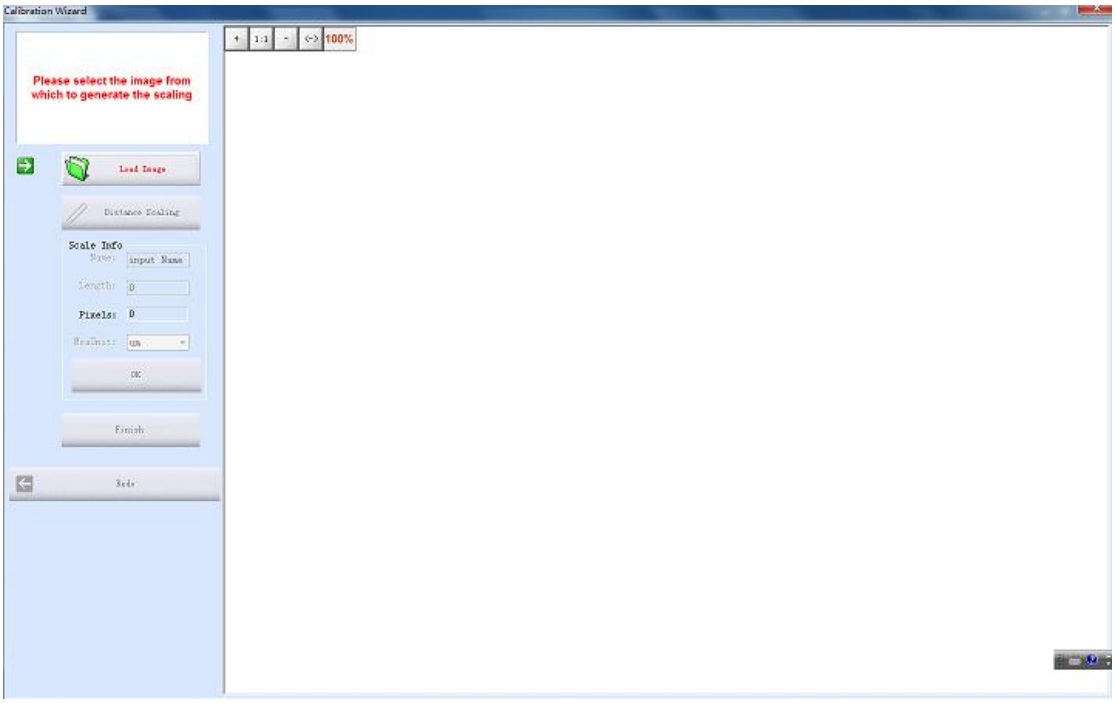

ISH300 #1
Measure
Help
Capture
Browse
Image
Image Processing
Fluorescence
HDR Image
Label
Class Counting
CELL1 = 19 28.8%
CELL2 = 27 40.9%
CELL3 = 9 13.6%
CELL4 = 11 16.7%
Compteur5 = 0 0.0%
Total = 66 100.0%
Start
Clear all
Export
30.1%
clovershoot.jpg
Current Picture:CloverShoot.jpg

Appendix 1:How to create calibration file

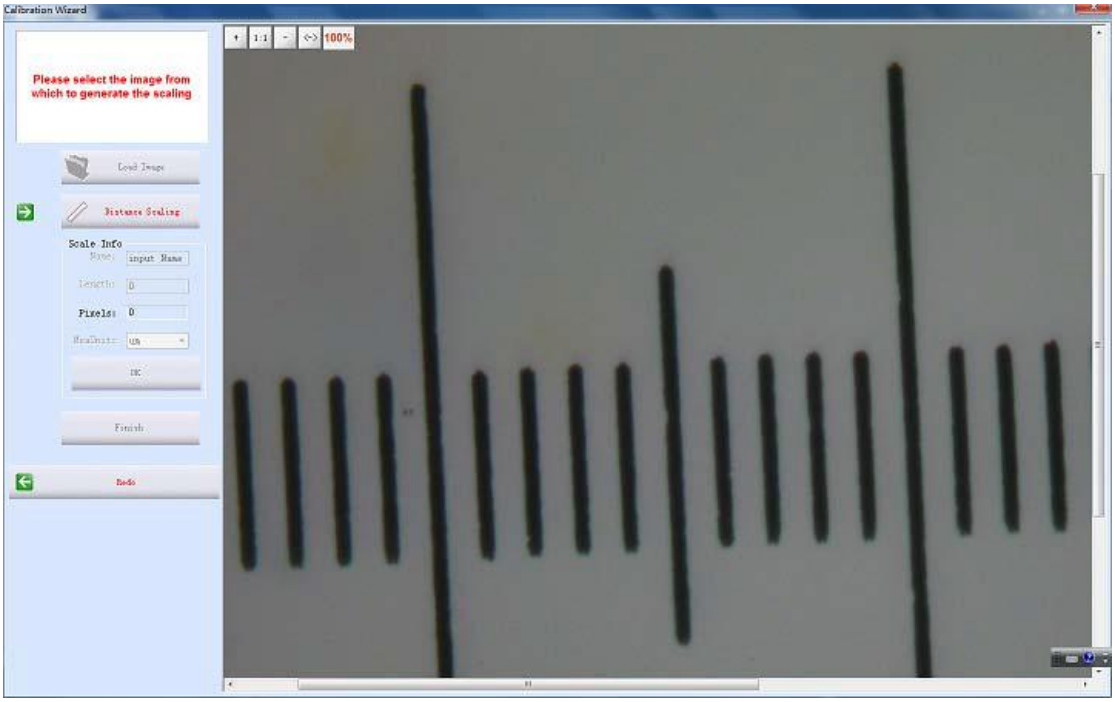
1. Take pictures of the calibration slide in all the required working objectives and resolution (if a reducing lens is also used in your application, it also requires you to take the calibration slide picture with the reduce lens attached).

If ONLY ONE objective and ONE resolution is used in the application, one calibration slide picture is enough. The calibration slide picture MUST be taken with exactly the same lens or microscope settings as the target image taken.

2. Click to start to create calibration file.

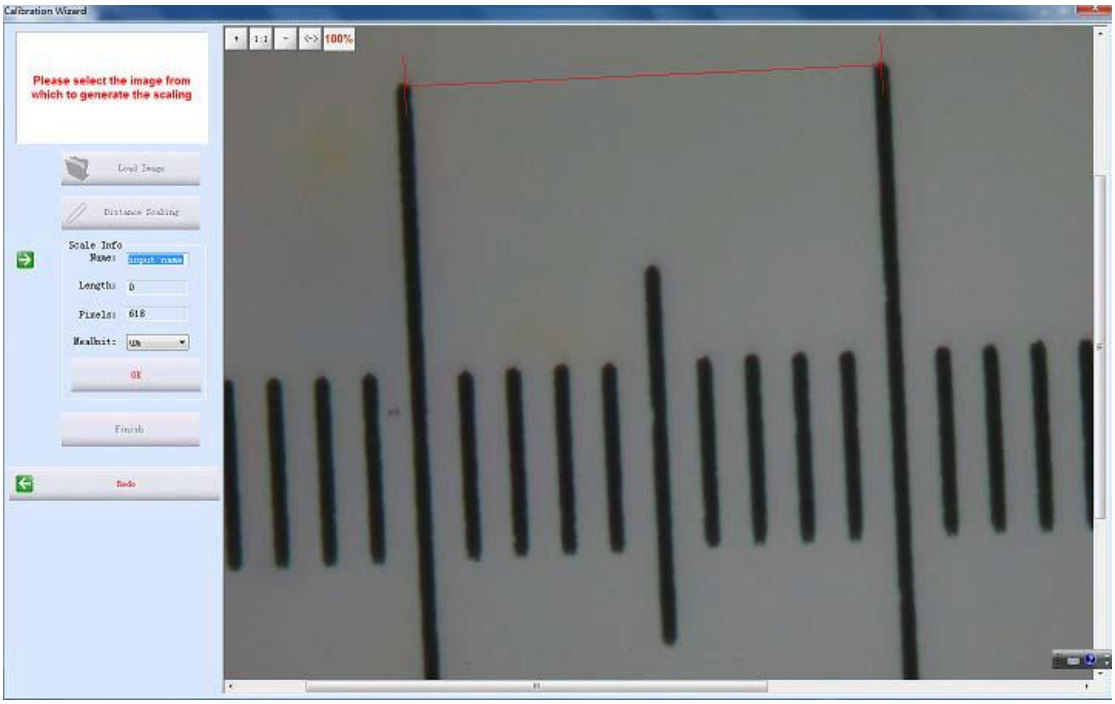


3. Click [Load Image] to load the calibration slide picture taken in Step1.



4. Click [Distance scaling] and move the cursor to the slide image, draw a line to get the reference length.

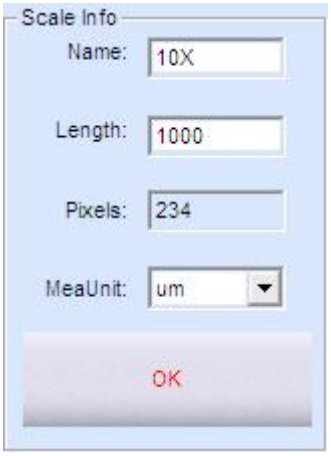
Using longer length as the reference length will give more accurate measurement results. For example, using 10 scale units as reference length will give more accurate result than using 1 scale unit.



5. Enter the name for the calibration file and the length of the line you draw.

If you need more than one calibration file, using objective+reducing lens(if it is used)+resolution as the name of the calibration file is recommended. This can help to prevent using the wrong file to do the calibration.

When keying in the length, please pay more attention to the calibration scale unit and the Measure Unit used here. For example, the calibration scale unit is 0.1mm; the Measure Unit is selected as µm; and the reference length is 10 scale units, so the length should be 10 x 0.1mm x 1000 = 1000 µm.



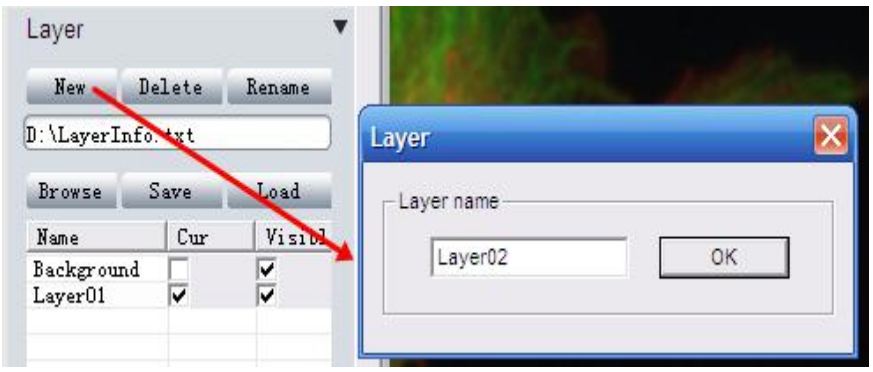
6. Click [OK] to confirm the calibration. The new calibration file named “10X” is created in the [Calibrate Table].

Appendix 2: Use Layer function for mass measurement

When need to apply mass measurement on the images, some different measurements would be overlaid which make the measurement much difficult. The layer function allows to create multiple layers to do different measurement which will make adding a large number of measurements on the processed image review simple and easy.

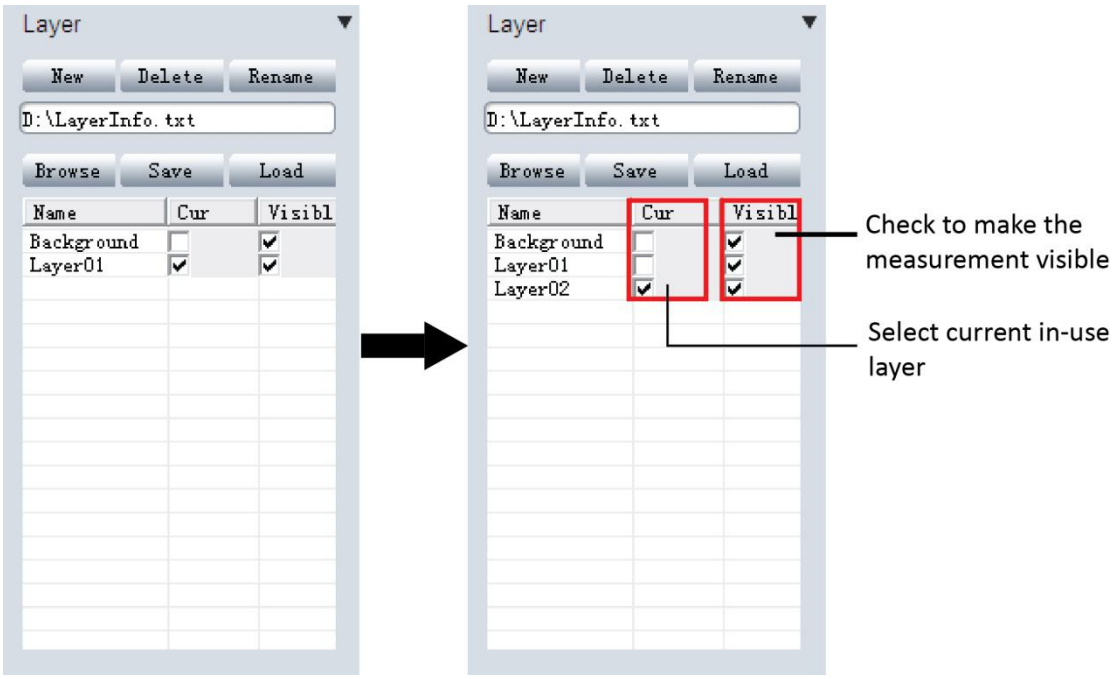
If you have already applied some measurements on the image, the **[Measure]-->[Layer]** function automatically creates “Background” and “Layer01” for the current image.

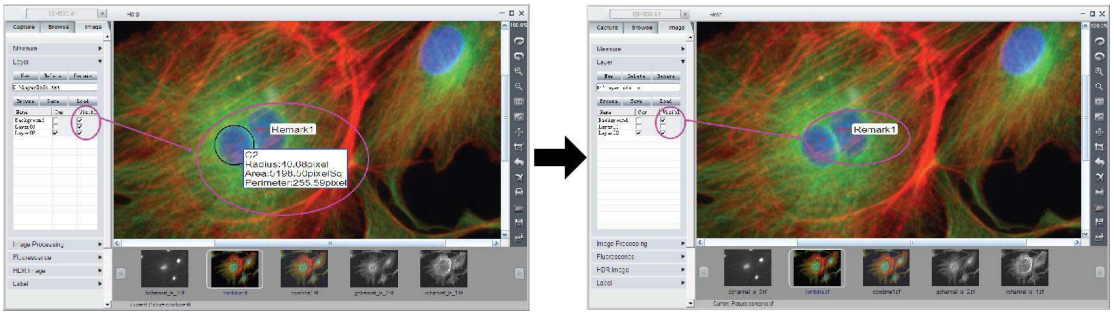
Click [New] to create a new layer. Allow to key in the preferred name for the new layer. It uses “Layer02”, “Layer03”... etc as the layer name by default.



Now loads of measurements can be applied on different layers. It allows you to choose any layers to view.

Checked [Cur] means the corresponding layer is displayed currently. Select different [Cur] to switch between different layers. In the [Visible] column, the selected check box means all the measurements in the corresponding layers also display on the current layer. Uncheck the check box, and the corresponding measurement will be invisible in the current layer





The layer information is saved in a text file.

- Click [Browse] to choose the text file saving directory and enter file name. Then click [Save] to save the current layer information in the text file. The layer information will be saved as “LayerInfo.txt” in Disk D by default
- Click [Browse] to find the existed layer information text file. Click [Load] to load the layer information to the current image.

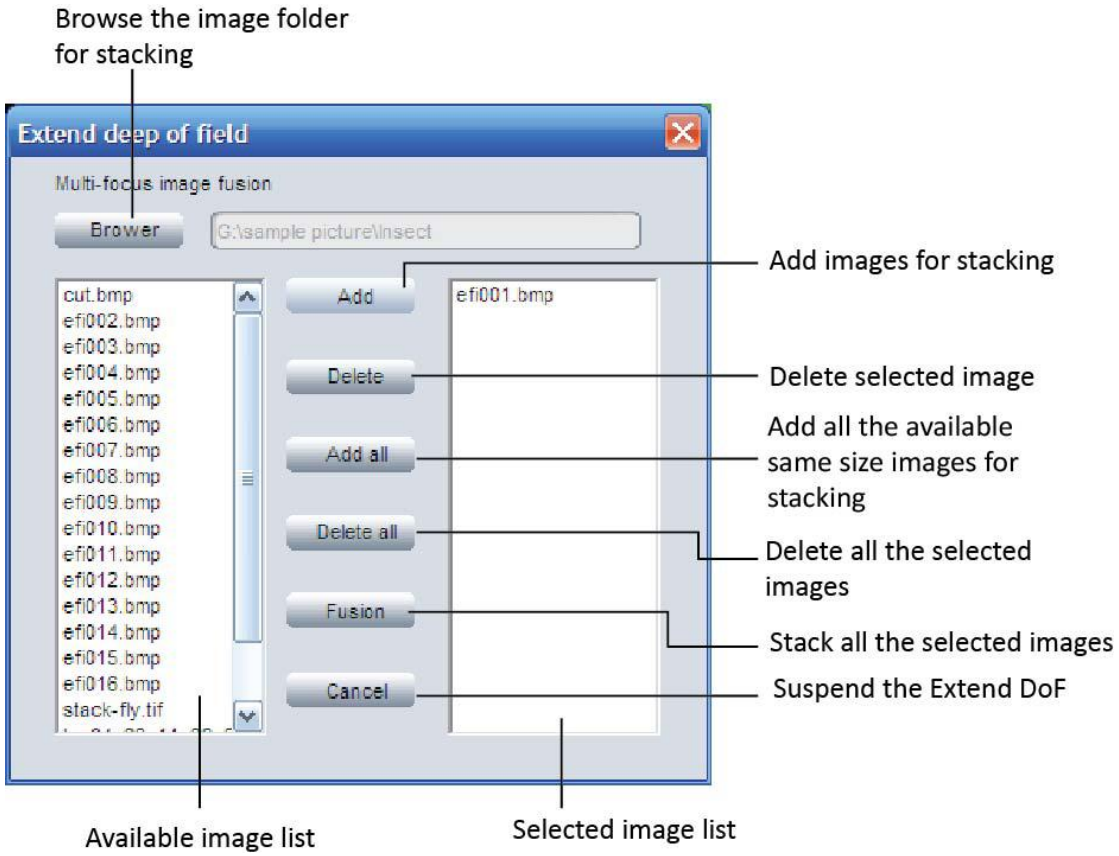
Appendix 3: Advanced functions

Extend depth of focus

Extend depth of focus functions combines multiple images to create one focused image. It is used to extend a picture's apparent depth of field.

Push [Extend DoF]

to get below dialog box. Select the corresponding images and apply the function. This function combines multiple images to create one focused image.



- Browse the image folder which you are going to do the stacking.
- All the images in the folder will be listed on the left hand side. Click

on one image, the image will be highlighted in BLUE.

- Click [Add] to add the highlighted image to the right hand side (the selected source images for stacking).
- [Add all] button allows to add all the same size images in the left hand side to the right as stacking source images by just one click.
- Click [Fusion] to stack all the selected source images and get an image with an extended depth of field.

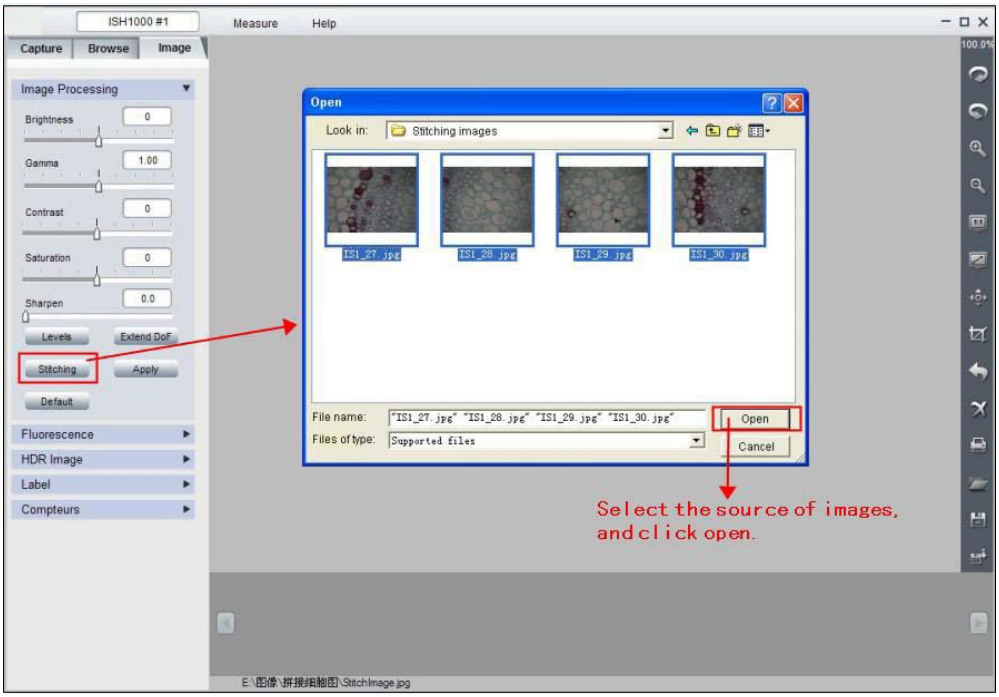
When selecting a wrong image as stacking source, just click on it and then click [Delete] to remove it. [Delete all] will remove all the selected images.

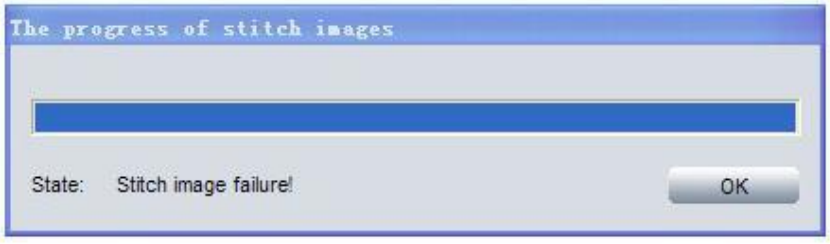
Image stitching

Click on

to get the image stitching configuration. It combines multiple images with overlapping fields of view to produce a large panorama or high-resolution image.

1) Click [Open] browse the stitching source images. Select all the source images and open them.
2) Click [Stitching] to start stitching all the source images.
3) Click [Save] to save the stitched image in the same directory as the source images with the name of date and time stamped.





If the source image did not meet the requirements, you will be prompted image stitching failure!