

User Instructions for Mosaic 1.6

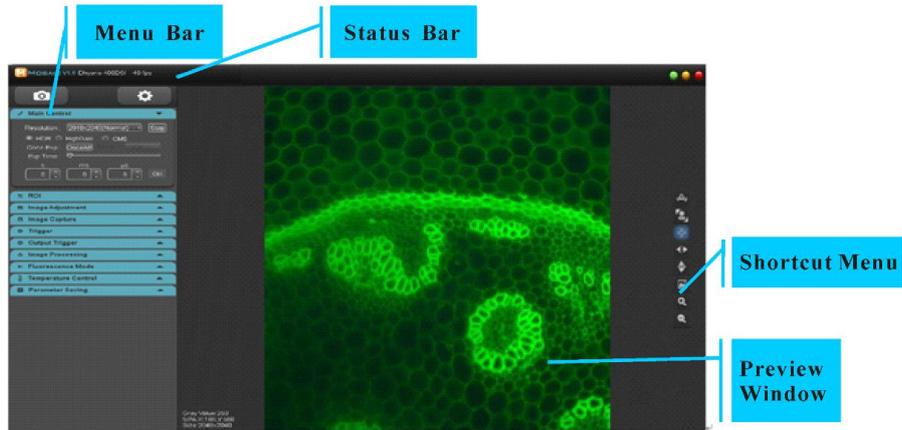
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1 Window

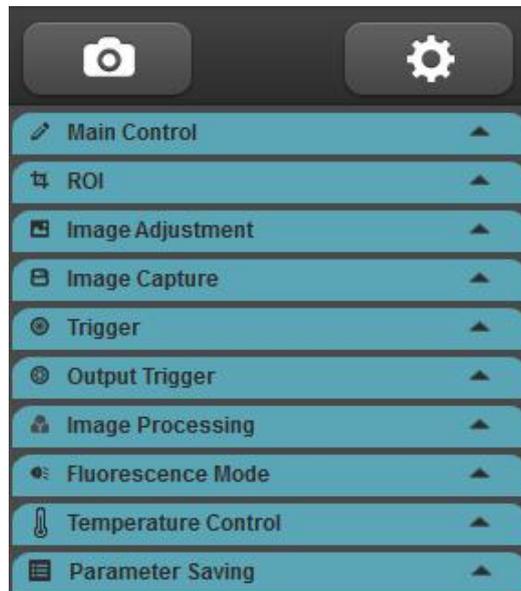


Status Bar



The status bar displays software version, camera model and real-time frame rate.

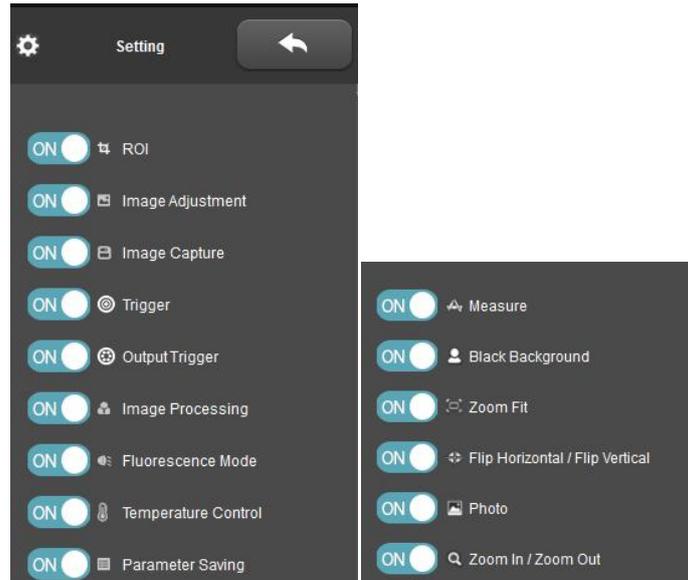
Menu Bar



All the functional modules supported by camera are listed on menu bar and the modules can be expanded or retracted.

In Setting module, you can choose to present or hide the corresponding module.

Dhyana 401D / Dhyana 201D does not support Temperature Control module.



Preview Window

Preview window will display preview image, gray level/RGB value, scale, coordinates and current resolution.

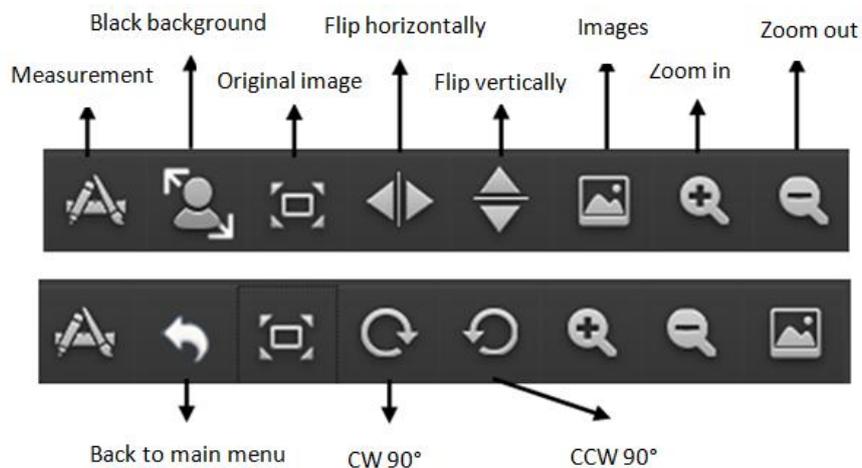


Mono camera

Color camera

Shortcut Menu

To satisfy various applications, the software is designed with multiple shortcut keys, so user can acquire an image quickly and conveniently. Specific functions are shown in the following table.



Shortcut function	Shortcut key	Remarks
Move image	Long-press mouse wheel for movement	Both preview interface and image processing interface are effective
Black background	Ctrl+B	Full screen display of preview window
Mirror horizontally	Ctrl+H	Only effective when preview interface is enabled
Mirror vertically	Ctrl+V	Only effective when preview interface is enabled
Zoom in	Ctrl+=\+, mouse wheel forward	Both preview interface and image processing interface are enabled
Zoom out	Ctrl+-, mouse wheel backward	Both preview interface and image processing interface are enabled
Images	Ctrl+P	Both preview interface and image processing interface are enabled
Self-adaptive/original image switching	Ctrl+F	Both preview interface and image processing interface are enabled
CW	Ctrl+L	Only effective when image processing interface is enabled
CCW	Ctrl+R	Only effective when image processing interface is enabled
Images selection path	Ctrl+O	Only effective when gallery interface is active
Back to main interface	Ctrl+Q	Only effective when images interface and image processing interface are active
Switch of LED	F2	Click software interface and press F2 to turn on or off the LED (Dhyana 400BSI V2 and 95 V2 support).
Switch of PI	F3	Click software interface and press F3 to turn on or off the PI (Dhyana 4040 supports)
Capture	F10	/
Close the software	F11	/

2 Image Capture

2.1 Basic Settings

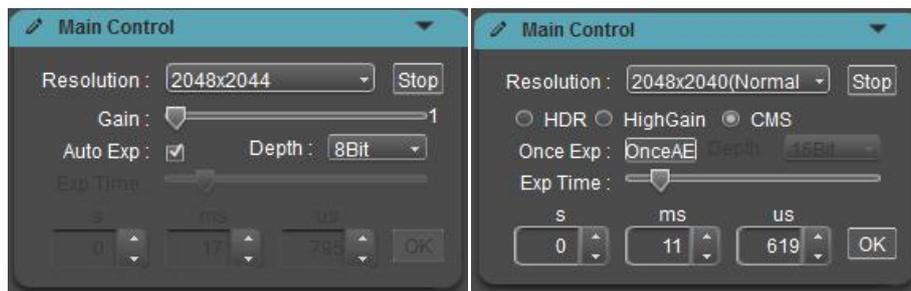
Configure the basic working status of camera to ensure that the camera works

normally.



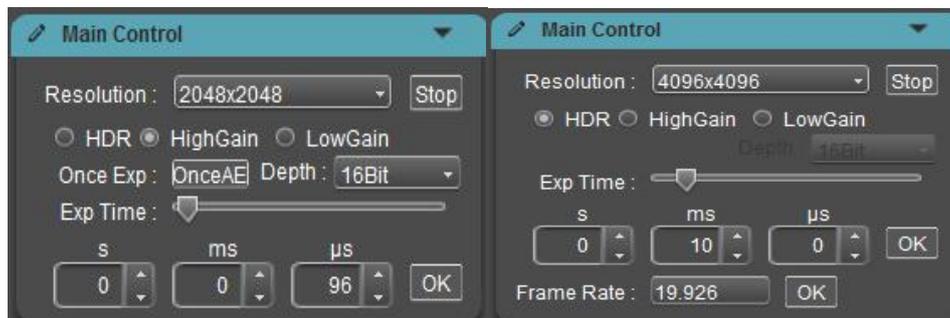
Dhyana 95

Dhyana 400D



Dhyana 400DC

Dhyana 400BSI



Dhyana 401D

Dhyana 4040

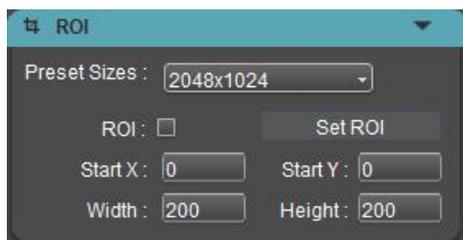
- **Preview (Live/Stop):** Start/stop preview. After preview is disabled, the image will be frozen.
- **Resolution:** Select the camera resolution.
- **Gain:** User can choose the most appropriate gain mode to transmit and preview image data depending on specific application requirements. (The gain mode supported by each camera is different and the Dhyana400DC camera is designed with HDR gain mode.)
- **Bit depth:** Only Dhyana 400DC and Dhyana 401D support. The displayed images

are 8bit data images. Mosaic allows users to select 8bit or 16bit data for display preview depending on actual applications.

- **Exposure control:** Set the camera exposure time.
- **Auto exposure:** The color camera supports auto exposure. If [Auto Exp] is checked, the software will acquire images of appropriate brightness by automatic adjustment of exposure time depending on image brightness. The auto exposure time range is 0ms~300ms. Dhyana 400DC supports only.
- **OnceExp:** The monochrome camera supports OnceAE. Click [OnceAE], the software automatically adjusts the exposure time according to the brightness of the specimen to obtain a suitable intensity image and locks the exposure time in the range of 1ms ~ 300ms. The range of Dhyana 400BSI V2.0 is 500us-300ms. The range of Dhyana 401D is 100us-10s (The response time is within 10s and excluding the exposure time).
- **Manual exposure:** Depending on actual applications, user can set the camera' s exposure time manually. General maximum exposure time is 10s, and Dhyana 4040 maximum support to 300s.
- **Frame control:** The frame rate can be customized according to requirements, only the Dhyana 4040 is supported under the CameraLink interface.

2.2 ROI

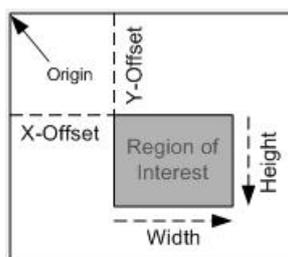
ROI (Region of interest) is used to define an area within the field of view and the camera only transmit the image information within the window. Smaller ROI helps to lower the image information quantity to be transmitted by the camera and processed by the computer. This will improve the frame rate of the camera. The ROI size for Dhyana cameras can be set by user. The row is an integer multiple of 4, and the column is an integer multiple of 8.



The methods of setting ROI:

1) Quick ROI: Click and check [ROI], and drag the mouse to draw a window zone on preview image; the interface will display coordinate of the ROI start point and the current resolution. Then, click [✓] below or double click mouse or press “ENTER” to apply ROI.

2) ROI setting: Manually input coordinate values of start point and ROI resolution. Input the offset, width and height of rectangle; then click [Set ROI] to apply ROI.



3)Preset ROI: The software is pre-configured with six central ROI of common size. Click the drop-down menu to quickly set the desired central ROI.

Note:

The set width of ROI must be integer multiples of 8 and height of ROI must be integer multiples of 4 and must not exceed the full resolution of the sensor. If the values entered are not compliant, the software will adjust them to the nearest compliant values.

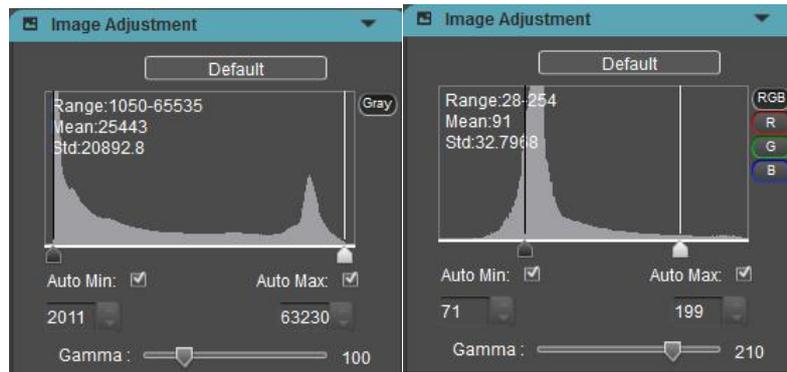
ROI size supports a minimum of 48 (column) x40 (row) pixels and Dhyana 400BSI V2.0 can support 48 (column) x 8 (row).

2.3 Image Adjustment

1. Histogram

During image acquisition, more authentic and vivid images are often needed for observation and analysis; the levels adjustment feature helps users to get better image

effects.



Mono camera

Color camera (Dhyana 400DC)

Adjusting levels redefines gray value or R\G\B of each channel and redistributes their pixels proportionally. Adjusting images' level zone and increasing the range of highlight zone in the image can brighten the image; of course, it is also possible to darken a bright image; the user can also adjust the three channels RGB and enable image color of the corresponding channel to change.

With the histogram, the user can manually adjust the shade of image, Gamma and brightness to calibrate image tone, including contrast, also brightness and layer of color images.

Auto level: By checking [Auto Min] or [Auto Max], the software will automatically define maximum and minimum pixels of each channel as white and black, and redistribute the pixels proportionally between the two limits.

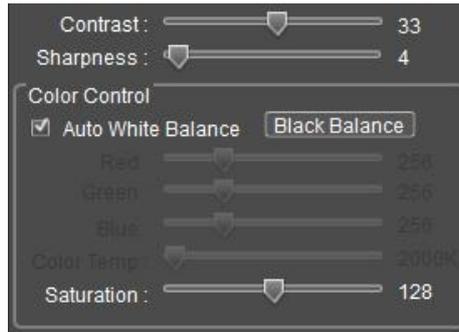
The Mean (average gray value), Std (Standard Deviation) value, and Range (gray value range) of the current preview image can be displayed in real time in the histogram. When the auto level is off and the histogram module is shrunk, camera frame rate can increase.

Note:

Auto level is not supported for individual RGB channels.

2. Color adjustment (Dhyana 400DC)

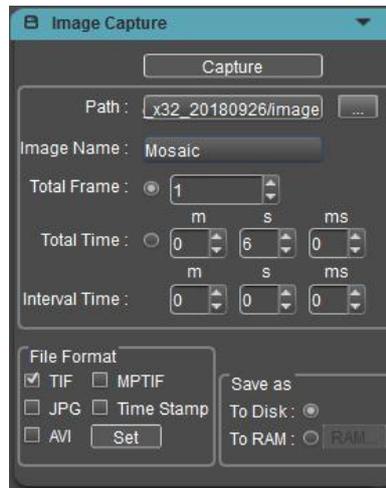
Mosaic allows the user to adjust the display parameters of the image depending on actual applications to obtain the image effects that better meet user needs. Default parameters are recommended reference values.



- **White balance:** By adjusting the proportion among three components R, G and B, camera can reveal the most authentic image color under varied light conditions. As default, the camera adopts automatic white balance and if there is stable lighting, the user does not need to check [Auto White Balance] to lock RGB gain at current white balance.
- **Black balance:** Lock black balance and set a group of defined R/G/B gain values, so that camera can properly restore image colors in weak light applications. It is generally used for imaging under a bioluminescence microscope.
- **RGB gain:** Manually adjust gain values of R/G/B channels.
- **Color temperature:** Obtain current proximity color temperature depending on R/G/B values or make manual adjustment and matching depending on actual ambient color temperature; as a result, white balance can be calibrated in a more accurate way.
- **Contrast:** Refers to the different brightness levels between maximum white and maximum darkness in bright and dark zones of an image.
- **Saturation:** Refers to the purity of color. The higher the purity is, the brighter the color will be; the lower the purity is, the darker the color will be.
- **Sharpness:** Refers to the contrast at edges within the image, which could reflect the plane definition and image edge sharpness.
- **Default:** Reset levels, Gamma, white balance, contrast, saturation, sharpness and DPC to factory defaults.

2.4 Image capture

Capturing currently required data from real-time video data stream and record them in the form of image or video for later-stage development and analysis.



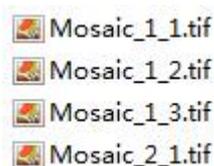
1. Save path

Under default status, the image file shall be saved to a filefolder specified in defined [Path], user could modify save path through [⋯].

2. Image name

A file will be saved with the name “Mosaic” as default, but the name can be customized. The image name can contain up to 64 bytes (exclusive of special characters \/:*?"<>| under half width; special characters cannot be input and there will be a popup window for prompt).

The image is named as follows:



3. Total Frame

Capture image as per set frames: Up to 99999999 frames can be set.

4. Total Time

Total length of image captured: Capture images as per set time length.

5. Interval Time

Interval time between two images.

6. File Format

Supporting TIF\JPG\MPTIF\Time Stamp\AVI and TIF format is the default format. Only one of the four formats can be checked, and the image format and video format can be checked at the same time.

TIF: Lossless image format, which can save all data transmitted by the camera without loss, and is suitable for applications with high image quality requirements.

JPG: Lossy compressed image format, the image size is small, but the quality of the original image data is degraded.

MPTIF: Save multiple TIF format images as a MPTIF format image.

Time Stamp: Save TIF original image, image information, stack image. This function is to meet the needs of high-precision observation of dynamic changes in the process and the time accuracy is 1us. The image information records the start and last time of each frame, the start location of the frame ID, the resolution, the bit depth, camera model, SN (only for USB3.0 camera), gain mode, exposure time and DPC.

AVI: The image data is saved in video format for playback of the dynamic process of the sample. Clicking the Settings button next to AVI will bring up a dialog box to select the compression format and video playback frame rate.



The video mode supports two formats: consistent record and play time or frame rate playback.

1) Video playback rate: Frames per second, can be customized by the user. In the video setting, the Play Speed function is checked to indicate playback at the frame rate. If the Play Speed is not checked, the recording time is the same as the playing time.

2) The default mode of the software is unchecked, and the recording duration is consistent.

Video playback frame rate: the number of frames played per second during playback, which is customized by the user;

Compression: Software provides 3 types of compression formats, FullFrame (NoCompression) / Microsoft_Video1 / Intel_IYUV. Videos of different compression formats result in different file sizes and user may select one depending on actual demands.

Note:

1) JPG and AVI format can support fluorescent staining, gamma, contrast, color gradation, 3D noise reduction, integration effects (No staining effect);

2) The image in TIF\MPTIF\Time Stamp format is the original image, without staining, gamma, contrast, color scale effect, but can support 3D noise reduction, integration effect, flat field correction and dark field correction;

3) After the monochrome camera adjusts the level, the preview interface displays the effect after the adjustment, but the pixel gray value of the preview interface does not change; the captured image is the original image, that is the gray value of the image does not change.

4) Color camera is same as before. After the color gradation is adjusted, the preview interface displays the effect after the adjustment, and the pixel gradation value changes; the captured image is the image after the gradation is adjusted, that is, the gradation value of the pixel also changes. To facilitate customer preview and qualitative analysis.

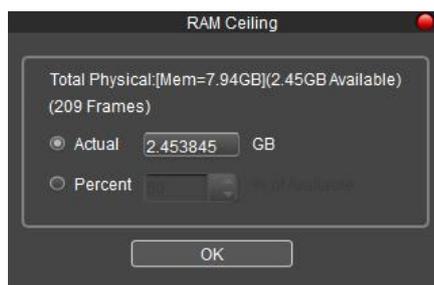
5) Except for the HDR gain, the TIF taked with the other gains is inconsistent with the

Mosaic preview. The image is 12 bits of data, with a high 4-bit complement of 0.

7. Save mode

The camera supports two saving modes:

[To RAM]: Save the data into computer memory; after image capturing, write the data into a disc file. By clicking the setting button, a prompt box will pop up, prompting the memory size and maximum image quantity. Also, user can customize the memory allocation.



In this way, camera can maintain high frame rate transmission during image capture, which can avoid data loss due to decreased frame rate. Limited by the size of memory space, this mode is not suitable for capturing images for a long time.

[To Disk]: Instant reading and writing. In the process of capturing images, the function will automatically write the data into disk. When capturing images this way, the camera frame rate will be reduced due to data file reading and writing. This is good for long-term shooting, but not recommended for quickly-changing scenes.

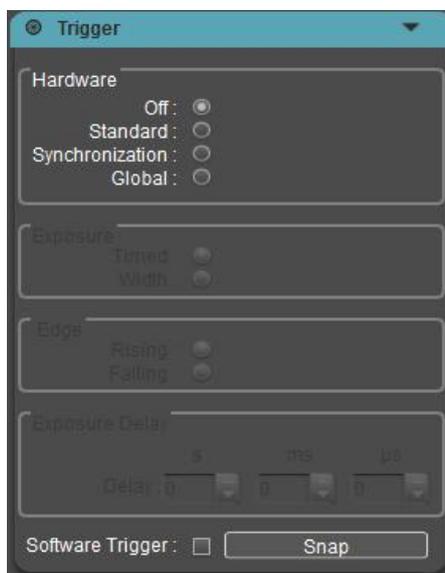
8. Image capture mode

Single images: When the Total Frame is set as 1, click bottom Capture once to capture one frame of image data and save one image.

Continuous capture: Capture multiple frames of image data at preset conditions, save multiple images and record the captured images into a video (AVI checked) simultaneously. Before continuous capture ends, the user can click [Stop] to stop it.

Video recording: Capture multi-frame image data at preset conditions and record them into a video.

2.5 External Trigger



There are two modes of image output: frame mode and streaming mode.

Frame mode: external trigger mode. The camera outputs individual images when hardware trigger occurs. There are four modes of triggering; hardware trigger (standard, synchronization and global) and software trigger.

Streaming mode: real-time preview mode, images are continuously captured by the camera and output in a stream.

1. Off

This means that the trigger mode is in the Off status; the camera is always capturing images.

When standard, synchronization or global mode is selected, the camera will switch to trigger and wait mode. Camera can take an image only after trigger signal is received.

Note:

When Off is selected, the trigger mode is closed, but if there is a signal input, the software can still capture and save images. This function is specially designed and similar to shutter function of a cellphone.

2. Standard

The Standard mode comprises several configuration modules.

Exposure

Timed: If enabled, exposure time will be set by the software.

Width: If enabled, exposure time will be set by the width of input pulse.

Edge

Rising: Trigger by the rising edge.

Falling: Trigger by the falling edge.

Delay: User can set a specific delay time before camera is triggered for exposure after a trigger signal is received.

3. Synchronization

This mode can be configured with one method; that is to say, exposure time will be determined by pulse width.

Edge

Rising: Trigger by the rising edge.

Falling: Trigger by the falling edge.

4. Global

Global mode is emulation of a global shutter in rolling shutter mode by simultaneous exposure of all rows through pre-triggering and external light source coordination. Two configurations are available:

Exposure

Timed: If enabled, exposure time will be set by the software.

Width: If enabled, exposure time will be set by the width of input pulse.

Edge

Rising: Trigger by the rising edge.

Falling: Trigger by the falling edge.

5. Software Trigger

Under software trigger mode, by clicking Snap, an image acquisition command will be issued to the camera. One image can be captured each time when Snap is clicked.

Note:

1) When the external trigger mode and the real-time preview mode are switched to each other, cancel the Apply button and check the different modes to take effect

directly.

2) When trigger mode selection, exposure mode selection, boundary selection, and delay setting are performed, cancel the process of clicking Apply button after selection and take effect directly.

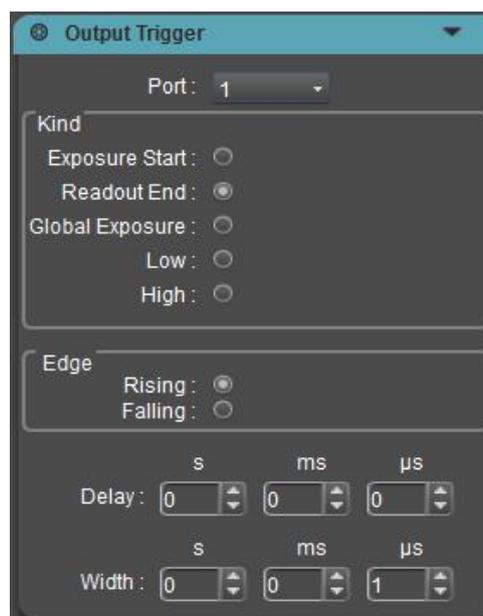
3) Shielding resolution, ROI, AVI format when entering external trigger mode.

4) Support saving parameters. When the software is turned on next time, it is still in the external trigger mode.

5) Trigger mode can support MPTIF and Time Stamp format.

6) External trigger can support control start and end, so MPTIF and Time Stamp formats are supported. The steps are as follows: First select the trigger mode, then configure the capturing parameters, then click Capture, and finally input the pulse signal.

2.6 Output Trigger



The camera has three trigger output ports TRIG.OUT1, TRIG.OUT2, and TRIG.OUT3, which correspond to Port1, Port2, and Port3 in the software interface.

The three output signals are on by default and are controlled by software. When the software is turned on, the signal will output. The camera outputs the level signal to a third-party device as its input signal. The three signals can work independently and can be output to different devices at the same time.

Note:

Dhyana 401D just support Port 1 – Readout End and Port 2 – Exposure atart signal.

1. Port

The hardware interface of trigger output has three pins, which can be configured for three ports. The trigger output is always on, and the signals of the three ports do not interfere with each other, and can be independently configured.

2. Kind (The configuration of the output level)

High: Output high level signal.

Low: Output low level signal.

Exposure Start: The signal output by the Exposure Start will be the level signal from the first line starts to exposure to the last line starts to exposure. Exposure Start is the default mode of Port 3 (The Exposure Start signal of Dhyana 400BSI V2 and new firmware Dhyana 95 (00011903220001190321 or later firmware versions) starts from the first line of exposure, and the signal width can be customized).

Readout End: The signal output by the Readout End interface will be the level signal from the first line starts to readout to the last line starts to readout. Readout End is the default mode of Port 1 (The Readout End signal of Dhyana 400BSI V2 and new firmware Dhyana 95 (00011903220001190321 or later firmware versions) starts from end of the last line readout, and the signal width can be customized).

Global Exposure: The signal output by the Global Exposure will be the level signal from the last line starts to be exposure to the end of the first line exposure. Global Exposure is the default mode of Port 2.

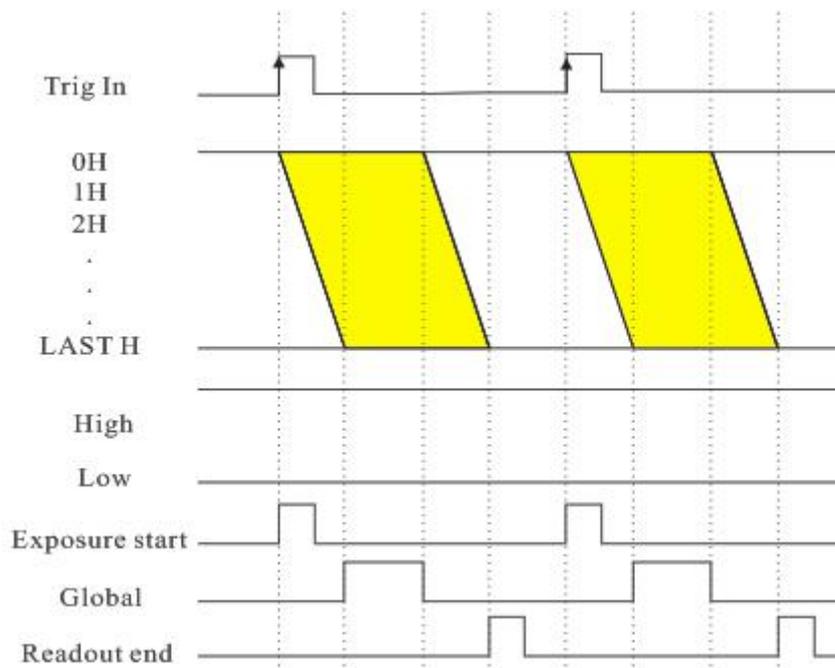
3. Edge: Configuration of the output signal polarity

Rising: The rising edge of the trigger signal is valid.

Falling: The falling edge of the trigger signal is valid.

4. **Delay:** Delay time for configuring the output level signal and the default time is 0.

5. **Width:** Configure the level width of the pulse and the default width is 5ms.

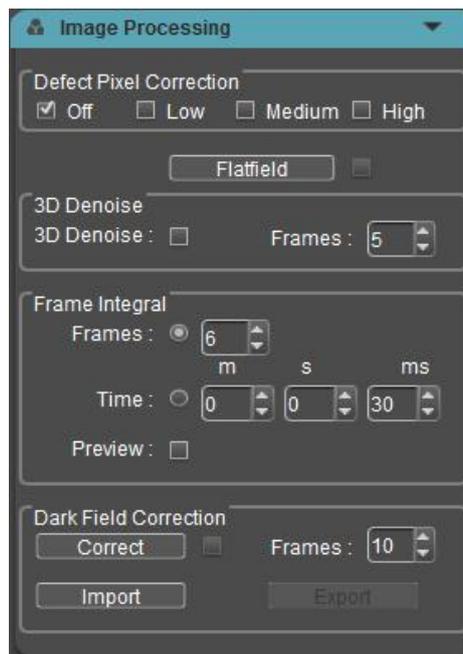


Note:

- 1) When the Global Exposure signal output is selected, the pulse width configuration is invalid and its output according to the actual pulse width.
- 2) When High or Low signal output is selected, other configurations are invalid.
- 3) The Delay and Width signals in the streaming mode cannot be too long, otherwise the next frame signal will be lost.
- 4) The configuration precision of Delay and Width signals is up to us, the setting range of Delay is 0~10s, and the setting range of Width is 1us~10s.
- 5) When the camera enters the external trigger mode, the port port can also output the same external trigger input signal. The delay time can be configured. However, the configuration of the pulse width is invalid, depending on the externally triggered input signal.
- 6) After selecting the triggering mode, the interface has stopped preview, but the

triggered output still has the stream mode signal. Only after clicking Capture button, the triggering mode is really entered and the output signal stops.

2.7 Image Processing



1. Defect Pixel Correction (DPC)

When it is turned on, it can remove the defect pixels on the image. The higher the grade, the stronger the correction ability. At the same time, it may cause pixel flashing in some scenes. The default grade is high.

2. Flat field correction

In actual microscopy applications, there may be phenomena such as imaging nonuniformity or color imperfections due to factors like microscope light source and optical system, or because of dirt on the objective lenses. Flat fielding can effectively reduce such defects, allowing the imaging in a more uniform way and color rendering to be smoother and more authentic.

The steps to make Flat fielding:

1) Click [Flatfield] to enter wizard, and move the visual field of camera to blank background zone.

2) Click [Next] to move the background to another blank zone and click [FlatFielding] to finish flat fielding.

3) Click to uncheck it and exit flat fielding; to apply flat fielding again, user just needs to check it again, without the necessity of further guide.

Note:

1) In Flat fielding, it' s required to set the exposure time manually, so that the image brightness will not have any overflow; all the pixel values fall between 64DN - 254DN.

2) Except moving spots, the two background images should maintain consistent brightness in other zones; they shall not be two images that are apparently different.

3) Confirm background flat fielding target; it' s recommended to use plastic, pottery or professional white balance paper.

4) During calibration, make sure that the background is a blank zone and the light is uniform. It' s required to recalibrate again after lens replacement.

3. 3D noise reduction

Through several averagely concurrent images, it is possible to filter out nonoverlapping information automatically, so as to save pure and exquisite images. The user may customize the number of frames used.

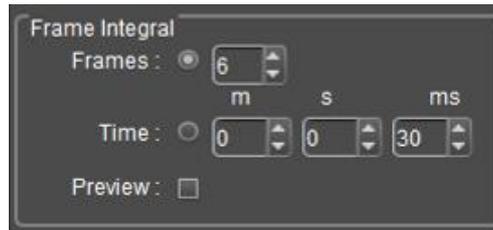
Note:

To save images processed with 3D noise reduction, we need to take multiple-frame image data continuously; therefore, it takes a longer time for imaging. 3D noise reduction takes multiple-frame image data continuously to filter out noise; therefore, this is only suitable for still images. If it is used for photographing dynamic scenes, this will cause blur or smear images. In addition, 3D noise reduction is not effective for video recording. Live preview is not supported.

4. Integral imaging

Capture multiple-frame image frames continuously as per preset conditions; accumulate multiple frames of data into one image to preview integral effects in real

time.

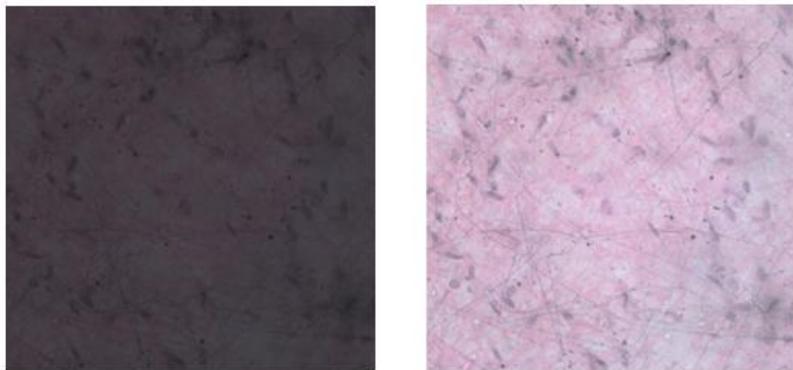


1) Integral by frame: Take images of preset continuous frames and accumulate them into one image.

2) Integral by time length: Take all the frames within the preset time period into one image; the frame data is the result of dividing integral time length by exposure time.

3) Preview: According to preset parameters, display integral effect on the image according to preset parameters, and make adjustment to optimal effects to take images. Integral photographing can brighten images to obtain better imaging effects.

Integral imaging can enhance the weak signal, improve the overall brightness of the image, and obtain better imaging effect. The integral imaging contrast effect is shown below.



Note:

1) As to integral imaging, it's required to set appropriate cumulative frames, otherwise, excessive image brightness may cause image distortion.

2) “integral frame” and “integral time length” cannot be enabled simultaneously; one mode can be selected each time.

5. Dark field correction

Dark field correction is used to solve the problem of chip corner brightness and background unevenness.

Note:

1) The default Correct enable cannot be checked. When the Import and Correct coefficients are turned on, the check is automatically checked and the dark field correction is turned on. At this time, the check state can be selected to be removed and the dark field correction is turned off.

2) Click on the Correct button and the box prompts “Please make the camera in dark field and choose frames” , then click the "Correct" button to enable "Dark Field Correction", click on the Correct coefficient and click Cancel to cancel the operation.

3) Frames defaults to 10 frames (users can set different frames as needed, range supports 1~99).

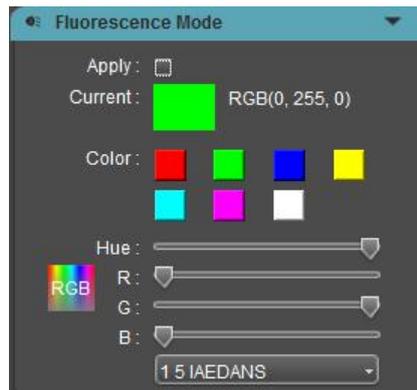
4) Import and Export are the import and export correction factors respectively

5) Dark field correction should be done separately for different exposure times and different scenarios.

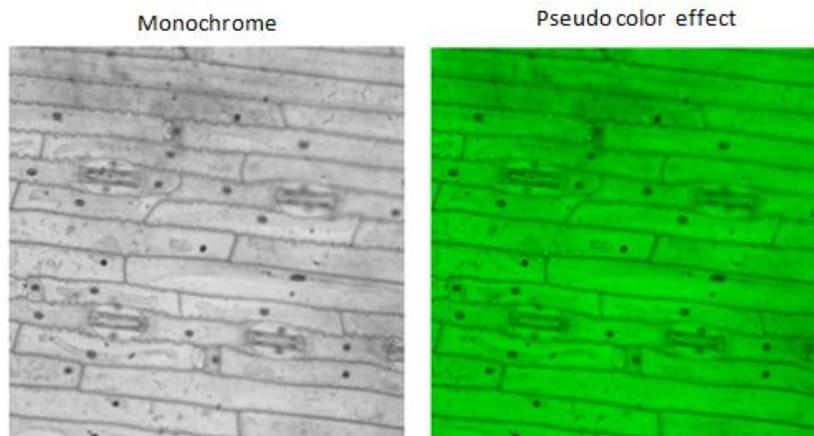
6) ResetAll can restore the Frame value and the Correct enable state, close the software and parameter group to save the Frame, close the software to clear the Correct enable and coefficient, and need to re-correct the next time the software is started.

2.8 Fluorescence Mode

Fluorescence mode is generally used for taking fluorescent images with monochrome camera. By adding pseudo color to the image by software, user can achieve the purpose of fluorescent color.



Check [Apply] to apply the selected fluorescence color to the image. But the images that were taken were original, without staining.



2.9 Cooling Mode (Dhyana 401D is not supported)

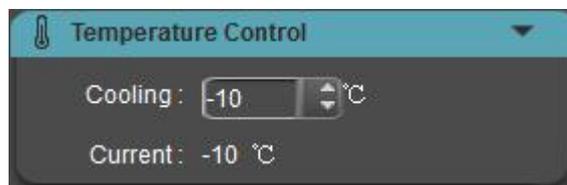
There is a thermoelectric cooler installed in the camera. The software can be used to control the cooling temperature of camera and reduce the working temperature of image sensor to reduce the noise.



The heat dissipation method is divided into fan cooling and water cooling.

Fan cooling

Fixed-speed fan: The fan is always running at a fixed wind speed, and the fan speed cannot be adjusted. The temperature can support -10°C and -20°C , and the default is -10°C .



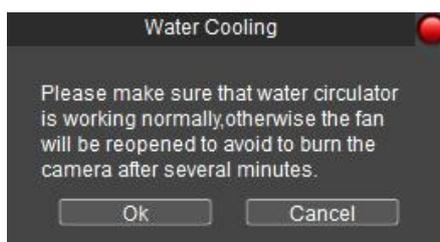
Adjustable-speed fan: After the camera is turned on, the fan keeps running at the maximum speed by default. And the fan speed can be adjusted by software. The grades are divided into High/Medium/Low/Off (Water Cooling). The temperature can support -10°C and -20°C , and the default is -10°C . The default fan speed of Dhyana 4040 is Medium. The temperature of Dhyana 4040 is fixed -20°C .



Note:

1) The temperature of the different fan grades is fixed at -10°C . The difference between the three grades is that the speed of cooling to -10°C is different.

2) Each time you select the Off, the following interface reminder will pop up, and you can turn off the fan after clicking OK.



3) If the Off is selected and the water cooling is not worked, the camera will do the protection mechanism. When the current temperature reaches 0°C and above, the highest-grade speed of fan will be automatically turned on to prevent the camera from burning the chip. If the software is turned off, the protection mechanism will not take effect.

4) The fan speed will be reset after restarting the camera. You need to re-open the software to take effect the original configuration.

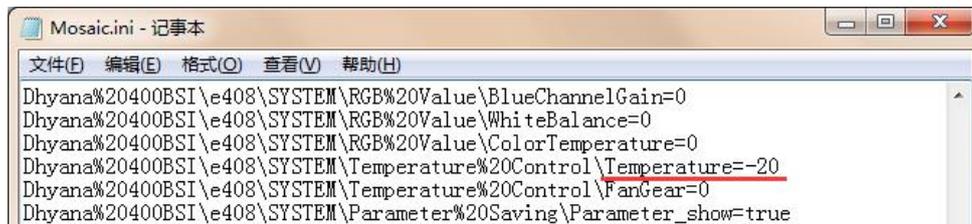
Water cooling (Dhyana 400BSI V2 and Dhyana 95 V2)

The camera that supports water cooling is equipped with a adjustable speed fan. It needs to be connected with an external water cooler. See the Quickstart of Dhyana.

The default temperature of water-cooled camera is fixed at -10°C (external water temperature is 20°C), but water-cooled cooling can reach -20°C or even lower. If lower temperature is required, the Temperature value in the software configuration file can be modified.

As shown below:

Dhyana%20400BSI\%e408\SYSTEM\Temperature%20Control\Temperature=-20



Warning:

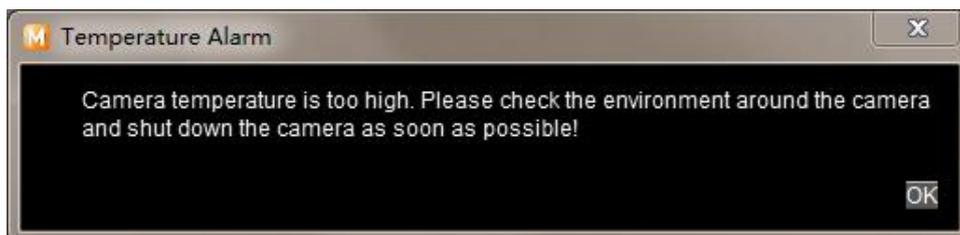
Water cooling and fan can be turned on at the same time, but they cannot be turned off at the same time. At least one cooling mode must be guaranteed. Otherwise, the chip may be damaged due to continuous high temperature operation.

Note:

Current temperature only shows the precision to single digits and does not display after the decimal point.

Temperature alarm

The camera supports the high temperature warning function. When the external ambient temperature is too high, the software will prompt the temperature alarm prompt message, and the camera indicator will turn red flashing (only D95V2.0 camera supports).



2.10 Parameter Group

In actual applications, the user will switch between multiple applications the camera or use it on different platforms. To facilitate user operations, the software has provided a parameter group management function; the user may save and load the setting parameters in each different environment to save operation time. The parameter group can save the configuration parameters of the functional module mentioned in above chapters (except flat field correction and dark field correction).



Group: Used to name a group; input a name to save and load it; you can view and load saved parameter group through drop-down menu.

Save: Save current configuration parameters into parameter group.

Load: Load a parameter group and apply it..

Delete: Delete currently selected parameter group.

Backup: Save parameter group file to a specified filefolder.

Recover: Load the parameter file from a specified filefolder.

Save As: Save a group of parameters into an independent file.

ResetAll: Click to clear all the parameters set by the user and return to the software factory settings.

Note:

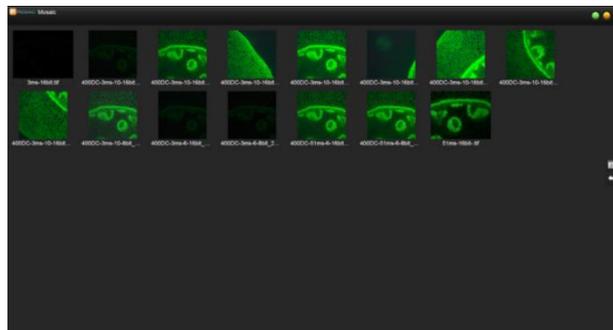
Copy parameter file to other computers for application loading. This function will enable the cross-platform transition of parameters to ensure that the user's experimental conditions remain consistent to the largest extent.

3 Browse and Edit Image

3.1 View Image

During operation, the user can click  to open, view or edit images and play back or download a video. The default setting is to open an image under preset save path. In the images window, select an image thumbnail, double click to view the image; right click to [**Delete**] the image, or you can delete one or several images through [**Delete**] on the keyboard.

In the Image view window, you can switch to the previous or next picture for browsing and processing by press the "Left" or "Right" on the keyboard.



Images window

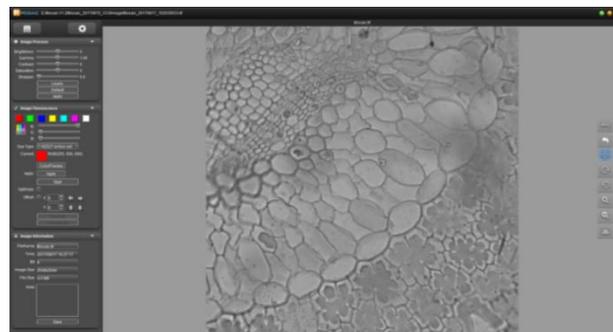
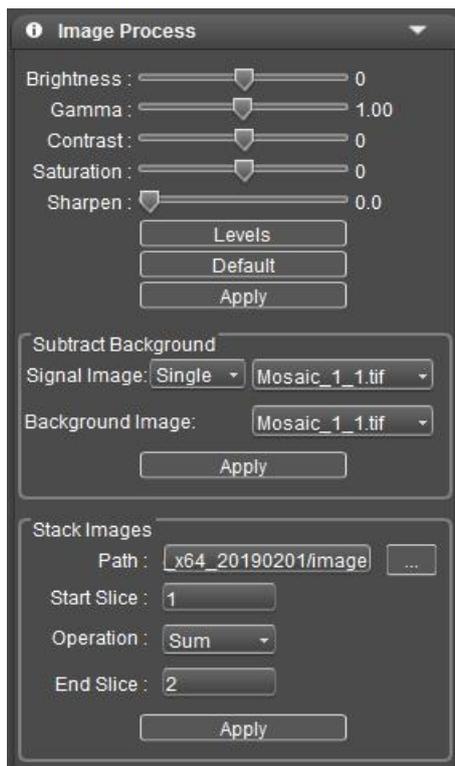


Image view window

3.2 Image Process

1. Image parameter setting

Adjust image parameter to correct captured image.



Parameter setting:

Brightness: Used to set the brightness of image.

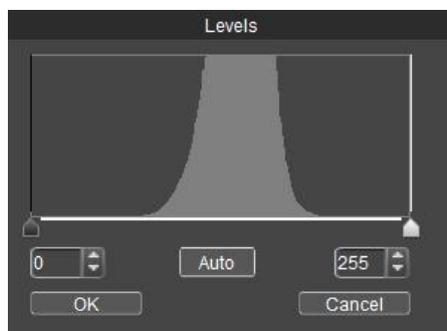
Gamma: Calibrate the display brightness of image in display.

Contrast: Ratio between maximum darkness and maximum brightness.

Saturation: The purity of color. The higher the saturation is, the bright the color will be.

Sharpen: Focus on blur edge of a part to enhance its definition or focal length degree, enabling the color of specific zone of the image to be brighter.

Levels: Used to adjust the gray level resolution of image; it's available to adjust levels manually and automatically within the range.



[Apply]: After parameter has been adjusted, apply parameter setting into image. The parameters in the Image Process and Image Fluorescence modules can be saved.

[Default]: Reset current parameter to default value, including brightness, gamma,

contrast, saturation, sharpen, levels, rotate and fluorescent dye.

Subtract background:

Real signal image = signal image - background image. Signal Image is set as the Signal Image, and Background Image is set as the Background Image. Click Apply to get the result image of the subtraction between the two images. The software supports single subtract background, also supports multiple subtract background, just stack select image folder, all images subtract the same background and get the new stack images after subtract background.

Signal Image has drop-down boxes Stack and Single, the default is Single;

Image sorting is only compatible with Mosaic's own chart naming rules.

The image of the signal image subtract the background can be displayed directly, and saved as the Single_Subtract_n.tif;

The image after subtracting the background from the stack images shows only the last one, and saves it as Stack_Subtract_n.tif.

Stack images

For applications such as single-molecule imaging, it is necessary to collect thousands or tens of thousands of images for each acquisition, and then perform single-molecule localization and accumulation on the acquired images, and finally obtain a superimposed result map.

Operation has a drop-down box Sum and Average optional (default Sum).

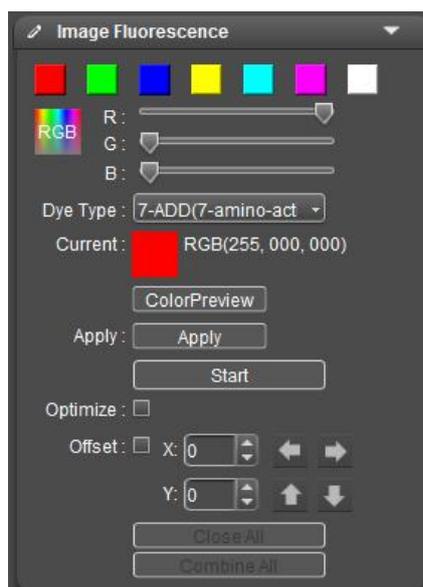
Image sorting is only compatible with Mosaic's own chart naming rules.

Start Slice and End Slice set the sequence of images to be superimposed.

The Stack overlay (Average and Sum) images can be displayed directly and saved as Average_n.tif or Sum_n.tif

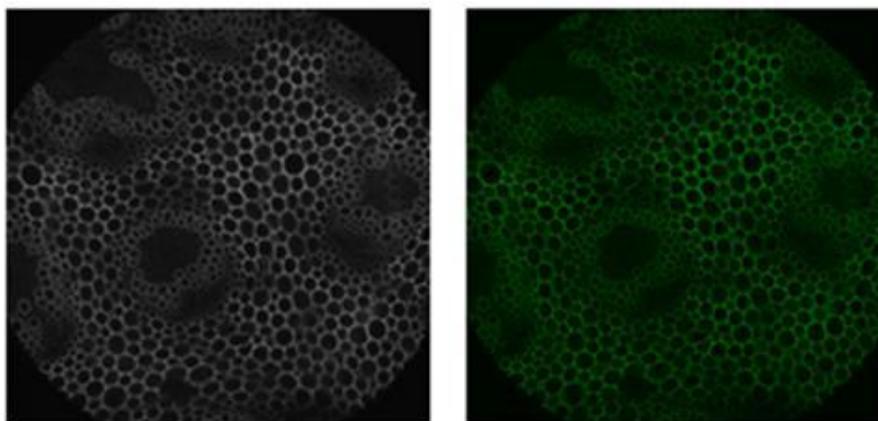
2. Fluorescence synthesis

In bioscience, different fluorescent dyes are adopted to observe different cell structures. Under a fluorescence microscope, we can only see one fluorescent image. Image fluorescence function will help users to synthesize multiple fluorescent images under the same visual field into one, thus obtaining a complete color image.



3. Staining

To find the gallery for the image to be edited, double-click to open the preview, click [Start] to enter the fluorescent color operation. Select the desired color, click [Apply Color] to see the staining effect. If other colors need to change, select the target color directly and click [Apply Color] again to obtain a vivid color image that is almost identical to the observation though the microscope eyepieces.



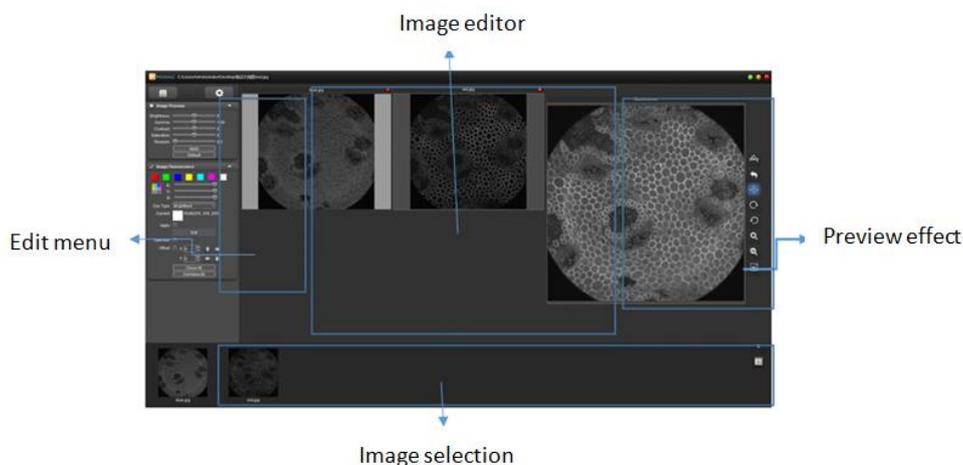
4. Optimization

Recommended to be checked to optimize a synthesized image and obtain a better effect. Unoptimized synthesis image synthesizes all the information of source image into the same image.

5. Synthesis

In fluorescence microscopy, a complete cell image is usually composed of multiple fluorescence bands. The synthesis function will integrate images under multiple

fluorescence bands into a complete image. Open the gallery and select the images to be synthesized (at least two, up to four) and click [Start].



Select the desired color, click [Apply Color] to determine the color. Do the same for other images, the software will be a real-time display of the current color of the final rendering. The image can still be fine-tuned, the detail of the current single image and the Offset through the parameter adjustment under Image Process, to finally achieve the desired effect. Click [Combine All] to complete the fluorescence synthesis.

Note:

If four images of the same format are selected for synthesis, the composite image format is consistent with the original image format. If four different formats of images are selected for hybrid synthesis, the composite image format is fixed to the TIF format;

Offset: While switching filter wheels under fluorescence microscope, it may cause certain mechanical dithering, resulting in images taken by the camera to have micro pixel error. Check [Offset], user may make micro movement adjustment for currently selected original image to correct pixel error. One numeric unit indicates one pixel.

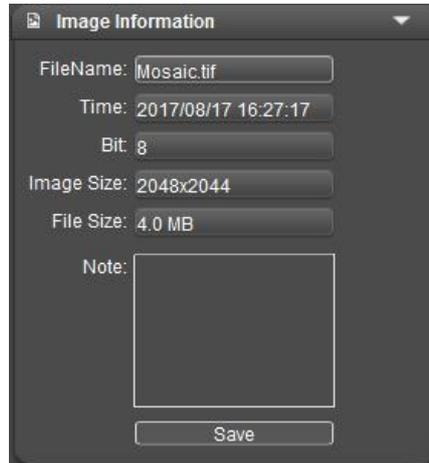
Close All: Close the source images selected currently and select new source images for synthesis.

Combine All: Synthesize current source images into one and save it locally; the format of currently synthesized images will be the same as currently selected source image.

6. Image information

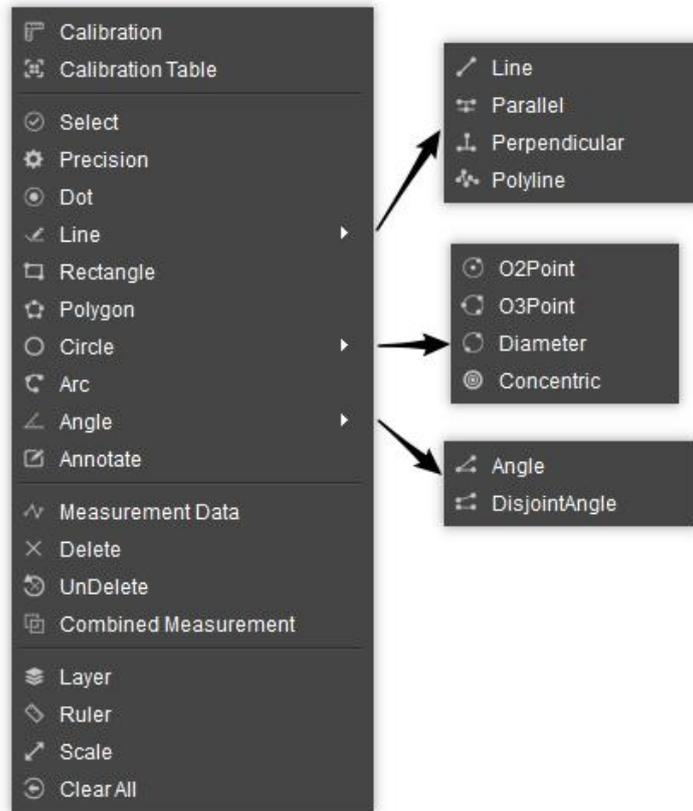
Obtain the information of captured images, including file name, capture time, bit depth, resolution and file size, to modify file name and add remarks.

In [Note] box, user may add corresponding remarks for current image and after content addition, click save. Next time you open the image, the remarks will show in [Note] edit box.



4 Measurement

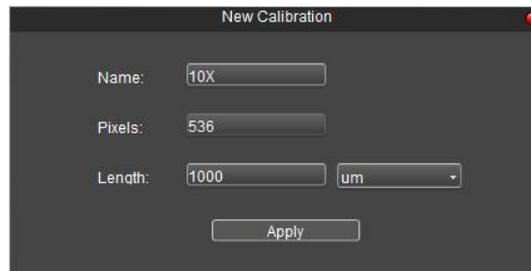
Mosaic is equipped with tools for making measurements in images; for example, if you want to measure the distance between two points in an image, you may use the measurement tool to draw a straight line between the two points and get real-time measurement data. All the measurement tools can be found in the functional zone of measurement. Click “33



Measurements made by the software are all executed with an image pixel as the basic unit. For example, line length is determined by the number of pixels along the line. Pixel level measurement uses measurement calibration to convert the dimensions into a more meaningful unit, for example mm or inches.

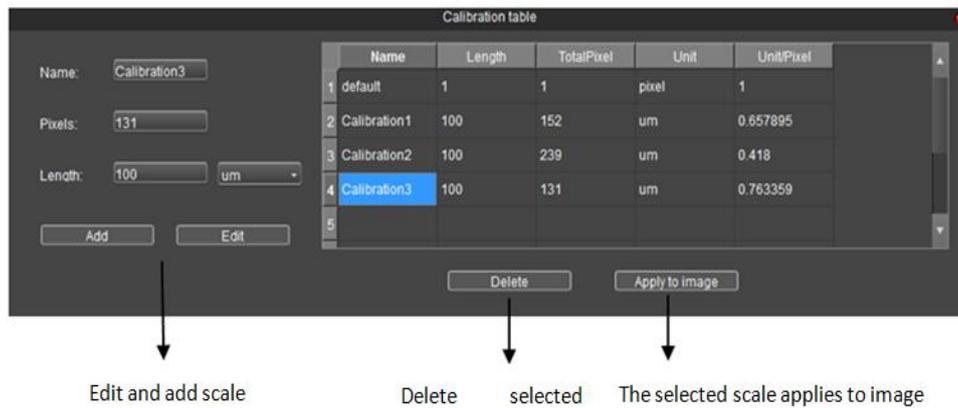
4.1 Calibration

[Calibration] Create calibration table: Convert pixels into meaningful measurement unit. Click [Calibration] to draw a line on the image and mark the length represented by the number of pixels of the line. Then mark the unit ruler of all measurement items.



[Calibration Table] View or edit calibration scales: Right-click the preview screen, bring up the measurement menu bar, and click [Calibration Table] to view or edit the

calibration ruler.



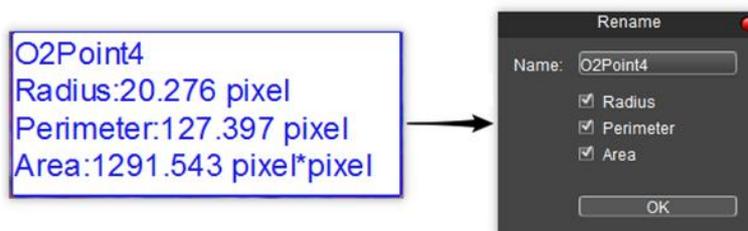
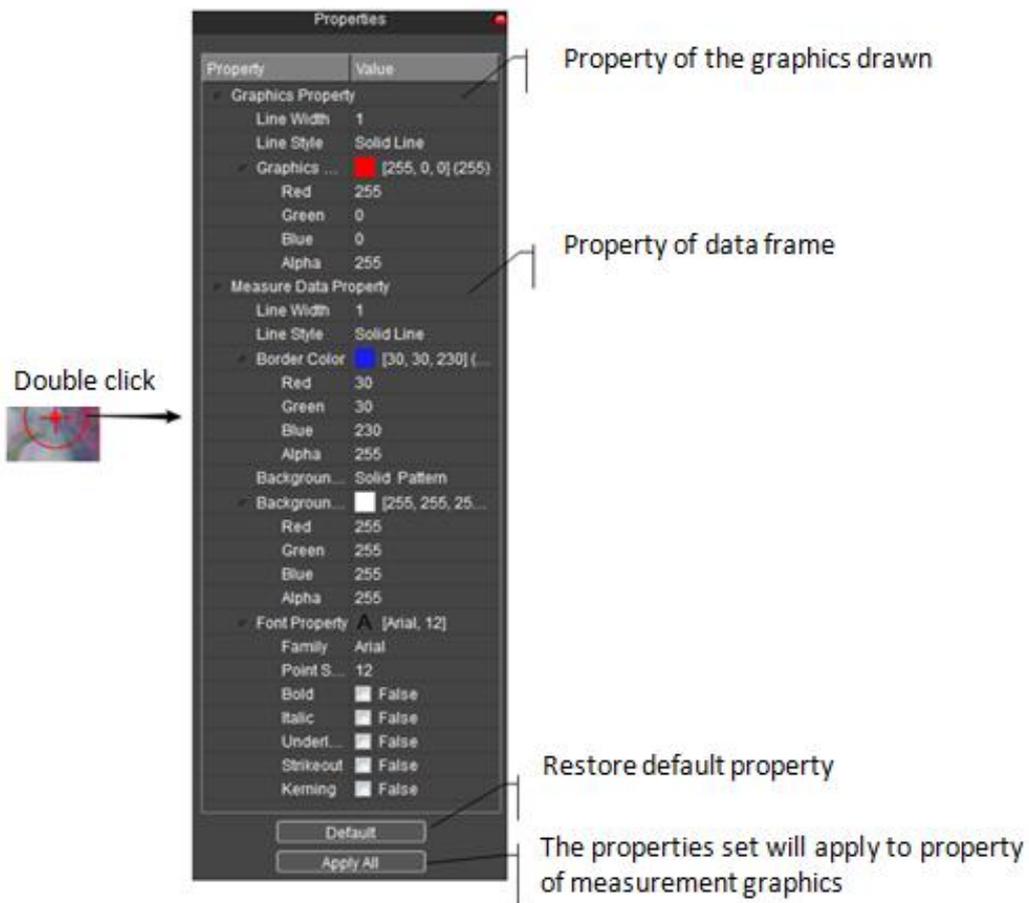
Note:

The calibration can be done more accurately with the aid of a micrometer. Choosing the wrong correction chart will result in the measurement result being completely wrong. When the image is measured, the correct correction table should be selected.

4.2 Measurement Tools

Select: Select an object; select a measurement object on the image to edit its property. Double click the measurement data property, the user can set the name and item of measurement.

- 1) Long press left button, to move the image selected currently to other positions on the image.
- 2) Double click the graphics property to modify the type property of the graphics.
- 3) Click measurement data frame, set the name measurement content of the graphics drawn.



Precision: Data precision; this function is used to set data precision; 0 to 7 decimal places is allowed.

Dot: Dot count. Make manual statistic.

Line: Draw a line between points. A line will be finished at the second click.

Parallel: Draw a parallel line; draw a line first, then click again to draw another line that is parallel to the first one. Double click to finish the drawing.

Perpendicular: Draw a perpendicular line; draw a line first, then click again to draw

another line that is perpendicular to the first line; double click to finish the drawing.

Polyline: Draw a polygonal line; left click to click a new line to already existing polygonal line; double click to finish the drawing.

Rectangle: Left click to select two endpoints to draw a rectangle; it's available to measure length, width, perimeter and area.

Polygon: Draw a polygon; left click for n times to draw a n-side structure; double click to finish drawing.

O2Point: Draw circle with radius; left click to select the center of the circle; left click again to select the radius distance and finish drawing.

O3Point: Draw a circle with 3 points; left click for three times to select three points of a circumference; click for the third time to finish drawing.

Diameter: Draw a circle with diameter; left click twice to select two endpoints of the diameter; finish drawing at the second left click.

Concentric: Concentric circle; draw a circle with radius; choose the center of a circle with the first left click and double click to finish drawing.

Arc: Draw an arc; take 3 points to draw an arc; finish drawing at the third left click.

Angle: Draw an angle, formed with two connected lines. Click to draw endpoints and finish drawing at the third left click.

DisjointAngle: Draw an angle, formed with two disconnected lines; click to draw endpoints and finish drawing at the fourth left click.

Annotate: Give comments in the graphics.

4.3 Measurement Data

Measurement Data: View measurement data of measurement graphics drawn; measurement data can be exported to Txt or Excel.

Number	Name	Length_poxel	Width_poxel	Height_poxel	Perimeter_poxel	Area_poxelSq	Radius_poxel	Angle_°	Slope
1	O2Point1				2125.304	359445.041	338.253		
2	O2Point2				37.291	110.662	5.935		
3	O2Point3				1700.427	230094.624	270.632		
4	Line2	398.358						167.336	-0.225
5	Parallel1_1	75.178							
6	Parallel1_2	130.717							
7	Parallel1_3	187.791							
8	Polygon1				344.306	6497.333			
9	Rectangle1		242.667	74.000	633.333	17957.333			
10									
11									

Export data to TXT Export data to Excel Refresh data Copy to clipboard

Delete: Select to delete a drawn measurement graph.

UnDelete: Undo the immediately previous Delete operation, but only one time.

Combined Measurement: With measurement photographing function for currently drawn plot. Photograph will be saved into image during photographing (Enable the function; the saved picture is of 8bit bit depth).

Layer: Create multiple layers; make different measurements on different layers. This function helps to meet the measurement demands and image processing demands of different applications.

Name	Current	Visible
1 Background	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 Layer01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

After the box is checked, current layer can be visible

After the box is checked, it means that current layer is being used

The Layer function will create “Background” and “Layer01” and existing measurements will be displayed under “Layer01” automatically.

The user may choose to display the measurement data of any layer and previewing any layer. By checking the box of a layer under **[Current]**, the user can preview the layer. By changing current layer to switch the layer displayed by the software. Check the box of a layer under **[Visible]**, the corresponding measurement information of the layer can be displayed in current layer.

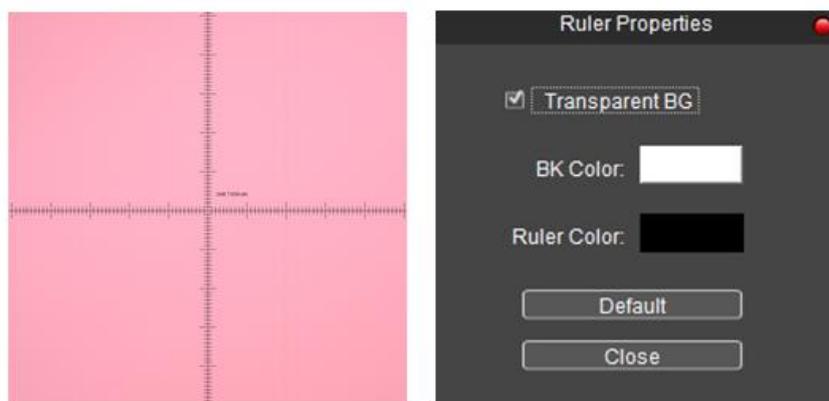
Click **[New]** to create a new layer; the user may customize the name a new layer; default layer names are “Layer01” , “Layer 02” , “Layer 03” ...

Click **[Delete]** to delete the selected layer.

Click **[Rename]** to rename a selected layer.

Click **[Browse]** to select the path for saving the text file and file name; click [Save] to save layer information into the text file. The default setting is to save layer information under the root directory and name it as “LayerInfo.txt” . Click [Browse] to find a saved image. Click **[Load]** to load corresponding layer information to the current image.

Ruler: Display/cancel cross ruler on the image. The specific unit length of ruler shall be determined by the selected calibration table. Double click any position of the ruler displayed on image to open a dialog box of ruler setting and set ruler color and background. Default settings are transparent background and black ruler.



Scale: Display/cancel current scale. By selecting it with the mouse, the user may move the scale to any position on the image; double click to modify scale type and property.

Clear All: Delete all the information of measurement graphics of current layer.