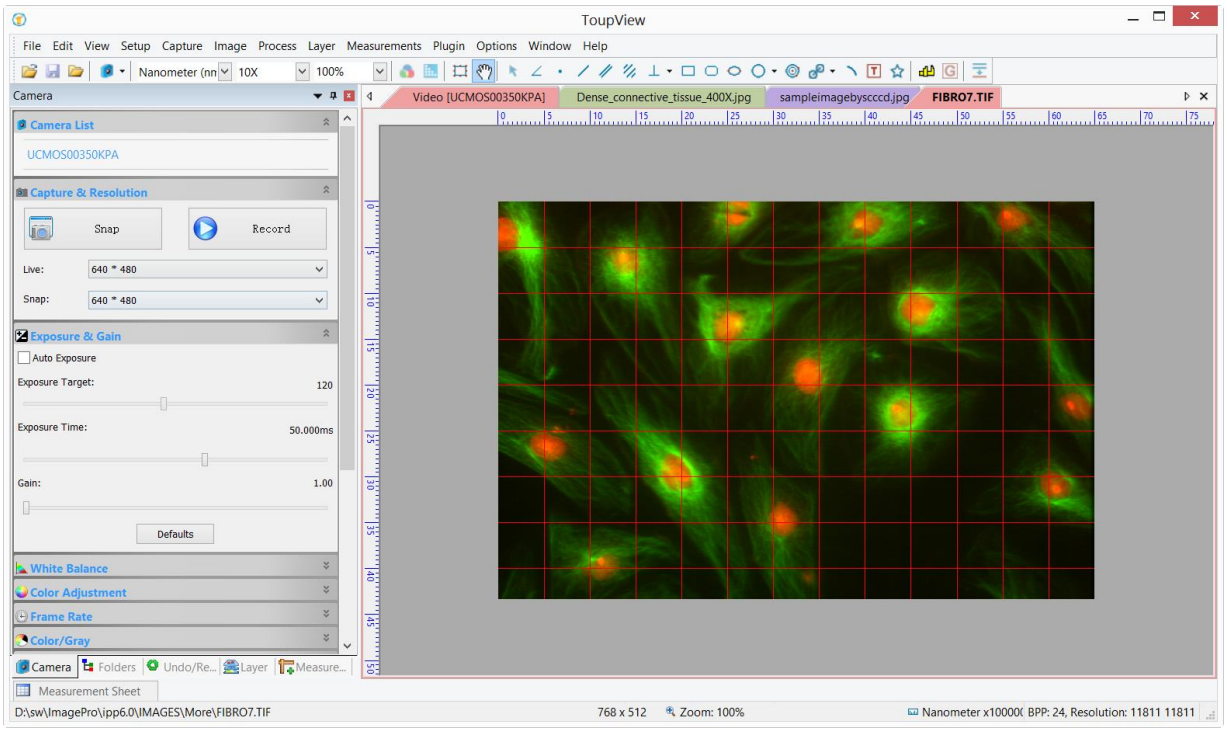
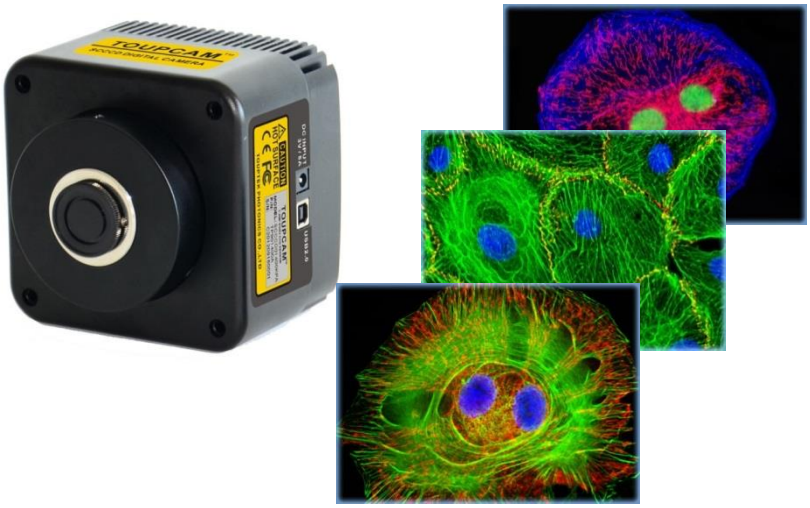
ToupView Quick Help





By

ToupTek Photonics

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1 ToupView

ToupView is one of the TOUPTEK PHOTONICS's most famous camera control software. It provides functions to fully control the camera and present the videostream processed by Ultra Fine™ color engine at high speed, which includes dedicated pipeline to process the raw data into a realistic scene. Besides, diversified useful tools are provided for specific purpose, such as luminance calibration, measurement, image stitching, extending depth of field, video watermark attachment, color composition, imaging processing and so on. Multi-language mechanism is also realized to support random language, which includes but not limited to English, Chinese, Russian, Turkish, Korea, Polish and so on. Now ToupView is widely used in the field of medical microscopic imaging, industrial detection, machine vision, astronomical observation, etc.

ToupView is totally compatible with ToupCam full series of digital cameras. With authorized license, ToupView software could be used with other cameras, which support Twain or DirectShow interface. ToupView is one of the best software in the camera industry, and the United States education department is strongly recommend

1.1 Operating System

Microsoft Windows:

- 32bit Windows XP, Vista, 2008, Win7, Win8
- 64bit Windows XP, Vista, 2008, Win7, Win8

Mac:

- OS X 10.6,OS X 10.7,OS X 10.8

Linux:

- Linux 2.6 or above

1.2 Supported Language

Standard Language Package:

- 1. Simplified Chinese, 2. Traditional Chinese, 3. English

Optional Language Package:

- 4. German, 5. Japanese, 6. Russian, 7. French, 8. Italian, 9.Polish, 10. Turkish

2 Start to Use ToupView

2.1 Start ToupView

1. Install ToupTekToupViewSetup.exe to finish the installation.
2. Double click on the desktop icon to start ToupView;

Note: If you are using the Windows 64-bit system, it's recommended to select the x64 ToupView to run ToupView for maximum performance, even though x86 ToupView could also work.

2.2 Open the Camera

ToupView will detect all of the cameras that your computer has installed (Here, it is UCMOS03100KPA, a 3.1M pixel CMOS camera) and will append all the camera names as submenu to the File>Camera List menu (Here, the submenu name is "UCMOS03100KPA").

Choosing the File>Camera List>UCMOS03100KPA will create a video window and start the video stream. The video window will be associated with the name of "Video [UCMOS03100KPA]" (i.e., its title bar name will be "Video [UCMOS03100KPA]").

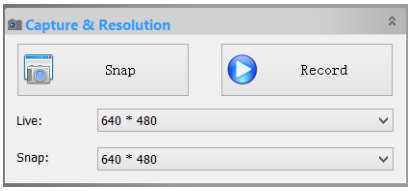
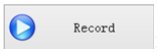
There are 4 methods to start the video stream, they are:

File>Camera List	◆ Choose the File>Camera List>UCMOS03100KPA (Here, a 3.1M pixel camera is installed) command to create the video window
Camera Sidebar	◆ Click the Camera Sidebar (If it is not activated) and the Camera List to expand the Camera List group (if not expanded). Click the camera name (Here it is UCMOS03100KPA) to create the video window;
Toolbar button	◆ Click the button 's down arrow on the toolbar to expand the camera list and choose the right camera (Here it is UCMOS03100KPA) to create the video window.
Twain Acquire	◆ Choose the File>Twain: Select Device••• command to select the device UHCCD01400KPA from the Select Source dialog (If never selected before) ◆ Choose the File>Twain: Acquire••• command. There should be a dialog box like below

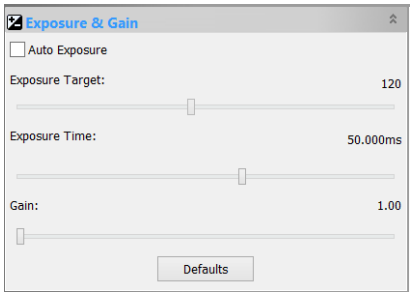
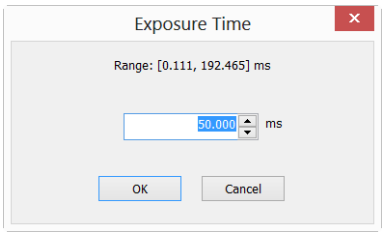
Note: ToupView supports the connection of one or more cameras to the computer at a time.

2.3 Adjust Settings of the Camera

2.3.1 Change the Resolution Setting

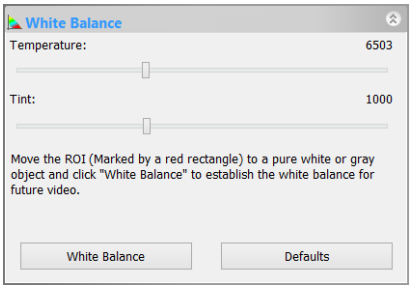
Control Group	
Function	◆ Snap : Click to snap images with specified resolution ◆ Record  : Click to start to record video ◆ Live: Set the Video resolution for preview ◆ Snap: Set the Snap resolution for capture
Remarks	◆Live: Select a resolution in the combox and videostream will be generated in the specified resolution continuously. Generally a small resolution is selected to obtain faster Video Frame Rate ◆Snap: Select a resolution in the combox and an image in the specified resolution will be obtained when clicking on the Snap button. Generally the maximum resolution is selected for high quality

2.3.2 Change the Exposure Time and Gain Setting

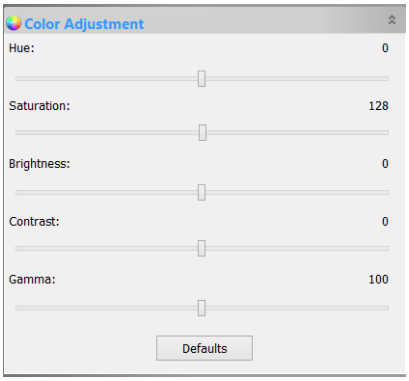
Control Group	 
Function	◆ When the Exposure & Gain group is expanded，a green rectangle viewfinder marked with Exposure will be overlaid on the Video. This labeled region is taken as the reference region for judging if the average brightness in the region has reached the Exposure Target value. The Exposure ROI rectangle border can be dragged to modify the size ◆ Uncheck the Auto Exposure box to switch the the exposure control from Auto Exposure mode to Manual Exposure mode. The Exposure Target slider will be disabled and the Exposure Time slider bar will be enabled for adjustment. Increasing the Exposure Time will increase the brightness and decreasing it will do the opposite. Increasing the Exposure Time has no effect on the frame rate until it reach a specific limit. If the Exposure Time is larger than the limit, the frame rate will be decreased ◆ In the Manual Exposure mode at a fixed Exposure Time, the image brightness can also be changed by adjusting the microscope light source ◆ Increasing the Gain can also increasing the brightness without having an effect on the frame rate. But Gain with a greater value will also magnify the noise. So only when the microscope light intensity is

	very weak, drag the Gain slider right to obtain a brighter scene
Remarks	◆ The primary user can choose Automatic Exposure mode, through setting the appropriate Exposure Target value, to make the image brightness comfortable to human eye. When the external light source intensity is changed, the software will adjust Exposure Time automatically to make the average brightness in the viewfinder area to the target brightness ◆ The other option is that user can uncheck the Auto Exposure and adjust the Exposure Time manually by dragging Exposure Time slider

2.3.3 Change the White Balance Setting

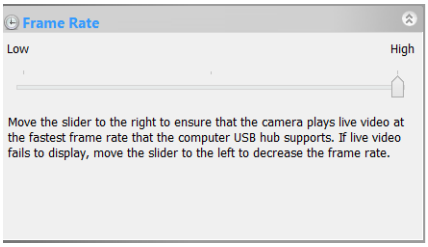
Control Group	
Function	◆ Expand the White Balance group and a red rectangular viewfinder marked with White Balance will be overlaid on the video; Drag the viewfinder to a pure white or gray object and click White Balance button to establish the video white balance for future video ◆ Temperature and Tint could be used to adjust White Balance setting manually for user defined purpose
Remarks	◆ It's recommended that the temperature value is set to a color temperature value of the light source to obtain a proper white balance effect ◆ Users could adjust Temperature and Tint value to obtain a particular effect. For example, set a lower temperature will have a warmer effect on the video

2.3.4 Change the Color Setting

Control Group	
Function	◆ Hue: Adjust the Hue value of the video ◆ Saturation: Adjust the saturation value of the video ◆ Brightness: Adjust the brightness value of the video

	◆ Contrast: Adjust the contrast value of the video ◆ Gamma: Adjust the gamma value of the video ◆ Defaults: Restore all the color settings to default one
Remarks	◆ Contrast and Gamma adjustment could bring sharper or brighter effect in some condition if users prefer.

2.3.5 Change the Frame Rate Setting

Control Group	
Function	◆ This group can be used to adjust the Video Frame Rate. Drag the slider to the right to ensure the fatest Video Frame Rate if your computer USB hub supports
Remarks	◆ If Video window appears black and fails to display, drag the slider to the left one step a time until the video window could display video normally. This condition happened when the USB transportation capability of hardware on PC side is not strong enough

2.3.6 Change the Color mode Setting

Control Group	
Function	◆ Color: Set the video to Color mode ◆ Gray: Set the video to Gray mode
Remarks	◆ Gray images can be used in applications without color requirement

2.3.7 Change the Flip Setting

Control Group	
Function	◆ Horizontal: If the Video on the screen appears in different horizontal direction, check this to set the video direction to the right one ◆ Vertical: If the Video on the screen appears in different vertical direction, check this to set the video direction to the right one
Remarks	◆ If the video has a orientation deviation of 90 or 270 degrees, please rotate the camera relative to the sample to adjust the video orientation

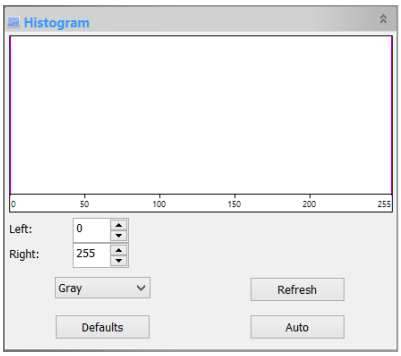
2.3.8 Change the Sample Mod Setting

Control Group	
Function	◆ Bin: Pixel binning refers to the method of combining (averaging) adjacent pixels of the same color. Since Bin will take some time, the frame rate in Bin mode is slower than that in Skip mode normally ◆ Skip: Also called Decimation, means that a certain amount of pixels is not read out but skipped (horizontally, vertically or in both axes). This reduces resolution of the resulting image to obtain a high frame rate with a side effect of introducing sub sampling artifacts
Remarks	◆ Bin: Good image quality, spend a little more time on calculation while the frame rate will be reduced ◆ Skip: Fast frame rate while the image quality is slightly lower

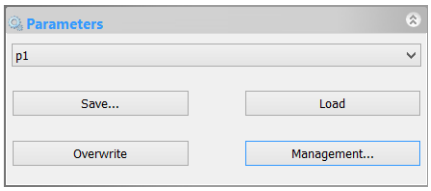
2.3.9 Change the Power Frequency Setting

Control Group	
Function	◆ This function can eliminate stroboscopic phenomenon between different countries and areas for different power frequency, please select it according to your national local power characteristics
Remarks	◆ It is 50Hz for China ◆ If the stroboscopic phenomenon still appears after choosed the right power frequency, please set the Exposure Time to the integer times of 10ms(50Hz)/8.333ms(60Hz). This can eliminate the stroboscopic phenomenon completely

2.3.10 Change the Histogram Setting

Control Group	
Function	◆ A Histogram illustrates how pixels in an image are distributed in each color channel. A Histogram can help you determine whether an image has enough detail to make a good correction ◆ There are two lines on right and left respectively. The pixels will always be destributed between the two lines. Resposition the lines will change the distribution of the pixels
Remarks	◆ Drag the left vertical line to the right will increase the image contrast while drag the right vertical line to left will will increase the image background brightness

2.3.11 Save & Load Parameter Setting

Control Group	
Function	◆ After the light source and the camera parameters are adjusted to make the video satisfied, the camera control settings can be saved by clicking the Save button. The saved parameter can be Load for the later use to resume the same scenario
Remarks	◆ The parameters could also be save, load, overwrited

2.4 Image Capture and Save

2.4.1 Single Frame Capture and Save

Click the Snap button on Camera Control Sidebar, an image can be obtained in a specified resolution.

Note: Using the ROI tool to select the region that you are interested in, the snapped image will be only the ROI area.

To save the current captured image, click Save button on the toolbar will invoke a dialog called Save as. Fill the content in the dialog and click Save will save the captured image. ToupView supported:

Window Bitmap(*.bmp，*.dib，*.rle)、JPEG(*.jpg，*.jpeg，*.jpe，*.jif，*.jfif) Portable Network Graphics(*.png)、Tag Image File Format(*.tif，*.tiff)、Compuserve GIF (*.gif)、PCX(*.pcx) Targa(*.tga) JBIG(*.jbg)、ToupView File Type(*.tft)

Note: For WindowBitmap(*.bmp，*.dib，*.rle)，Compuserve GIF (*.gif)，PCX(*.pcx)，Targa(*.tga)，JBIG(*.jbg)，ToupView File Type(*.sft)，the Options button is not enabled to indicate that these formats do not have optional settings.

For JPEG(*.jpg，*.jpeg，*.jpe，*.jif，*.jfif)、Portable Network Graphics(*.png)、Tag Image File Format(*.tif，*.tiff), the Option button is enabled. The corresponding dialogs are shown as below(Fig.2~Fig.4）：

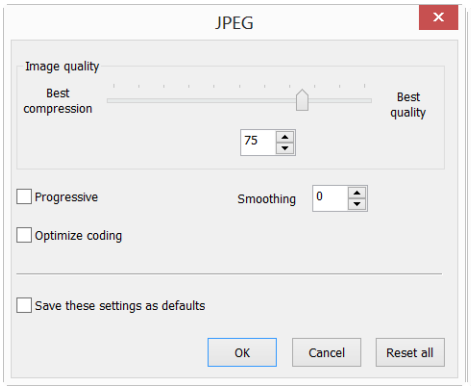


Fig.2

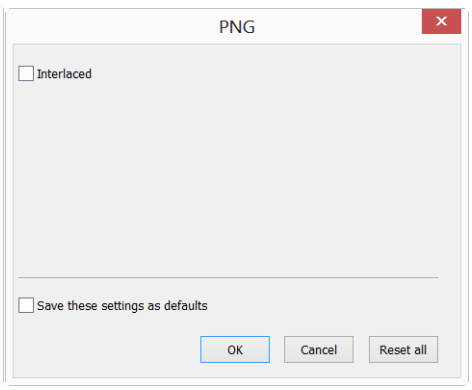
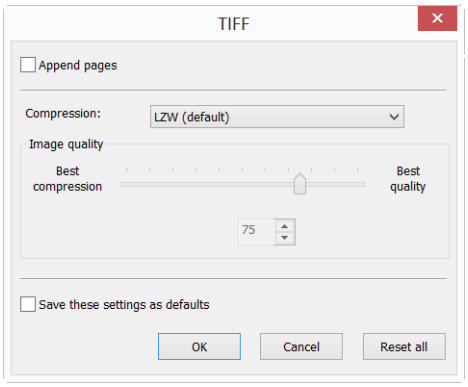


Fig.3



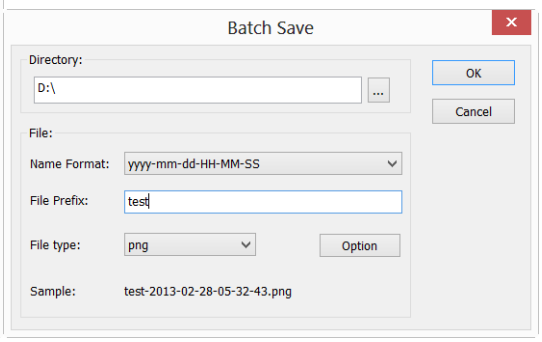


Fig.4 Fig.5

Image quality	◆ In case to save an image in JPEG format (*.jpg), Image quality in the edit box is available for adjustment. The values range from 0 to 100. Default value:75
Progressive	◆ The default is unchecked
Optimize coding	◆ The default is unchecked
Smoothing	◆ The values range from 0 to 100. Default value:0
Save these setting as defaults	◆ When saving a file, the current settings will be saved as defaults for the next file save operation if this box is checked
Interlaced	◆ The default is unchecked
Appended pages	◆ Determine whether the current image will be saved in multiple pages style or not
Compressions	◆ TIFF format can be chosed in different compression ways, default value: LZW (default)
Image quality	◆ In case of choosing Compressions as JPEG, the Image quality is available or adjustment. The values range from 0 to 100. Default value: 75
Reset	◆ Set to a specified value
Save these settingas defaults	◆ The current settings will be saved as defaults for the future

2.4.2 Sequence Capture and Batch Save

Choose Capture>Time>Lapse menu to set the Time-lapse(Auto Capture) parameter. (See Fig.1)

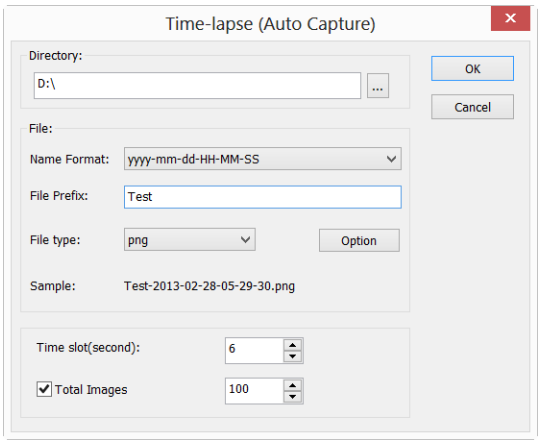


Fig.1

Sequence capture is also called Time-Lapse Capture, This command can capture a sequence of pictures in a predefined interval. User can specify the directory and naming format for the captured images, precisely set the interval (Time slot,from 2 to 3600 seconds) and the total number of images.

When a lot of images are capture, the File>Batch Save… will be enabled.

The captured files can be saved at a time by choosing File>Batch Save… menu(Fig.5).

2.5 Video Record

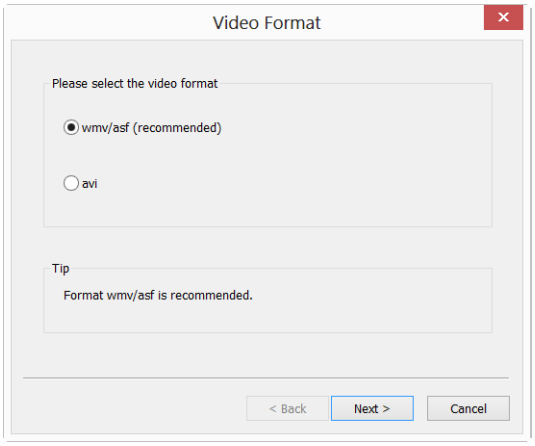


Fig.6

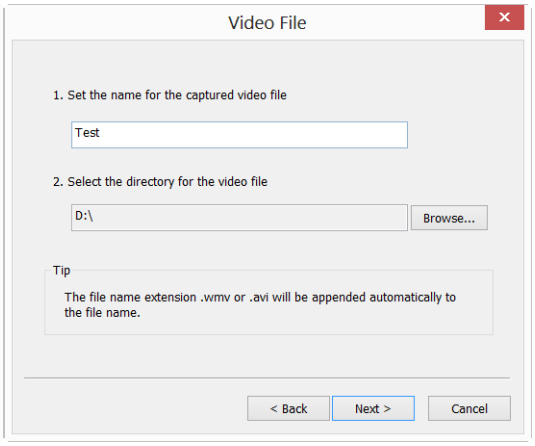


Fig.7

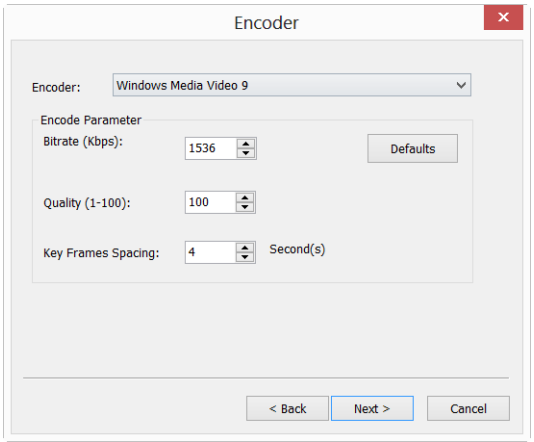
Clicking the Record button

on the Camera control sidebar in the Capture & Resolution Group will bring up the Video Format dialog（Fig.6）. Check the wmv/asf or avi and click Next to invoke the Video File dialog as shown in Fig.7.

Fill the Video File Name and Directory, clicking Next will invoke the Encoder dialog (Fig.8).

Here you can select the Encoder format, set the Bitrate(Kbps), Quality(1-100) and Key Frames Spacing (1-30), clicking Next will invoke the Display Information dialog(Fig.9)

Here you can enter Title, Author, Copyright and Description to their fields. Clicking Back to return to the Encoder dialog, or Next to the next step (Fig.10).



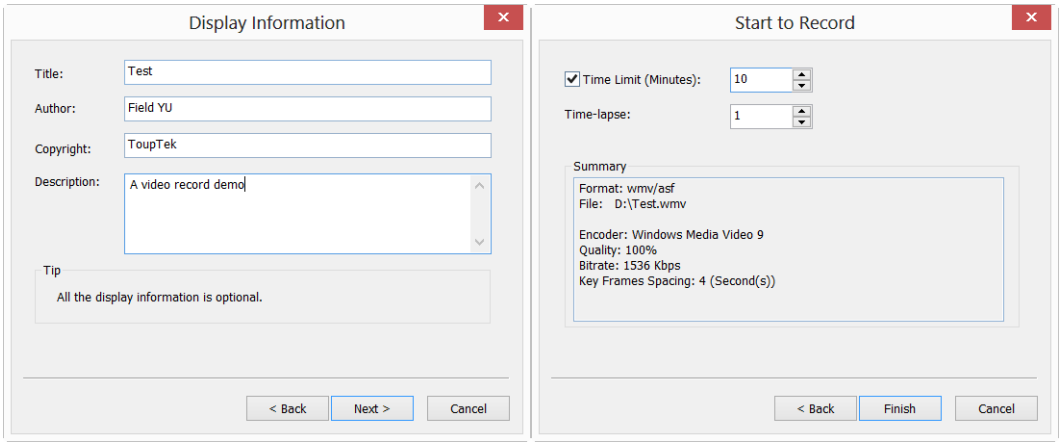


Fig.9 Fig.10

A dialog called Start to Record will be brought up(Fig.10). Here you can check Time Limit (from 1 to 1440 minutes), enter recording time (If checked) and Time-lapse (1-100). There is a Summary that displays all the options. Click Finish to start to record the video.

After the Video Record is started. The Record

button on the Camera Sidebar will become

. Clicking

will stop the recording process.

2.6 Open the Browse Window

Choose the View>Browse menu from the View menu or click the Browse toolbar button to browse images under the specified directory on the Folders Sidebar;

Click the Folders Sidebar to activate it and double-clicking the listed directory in the Folders Sidebar will create a Browse window as shown below(Fig.11).

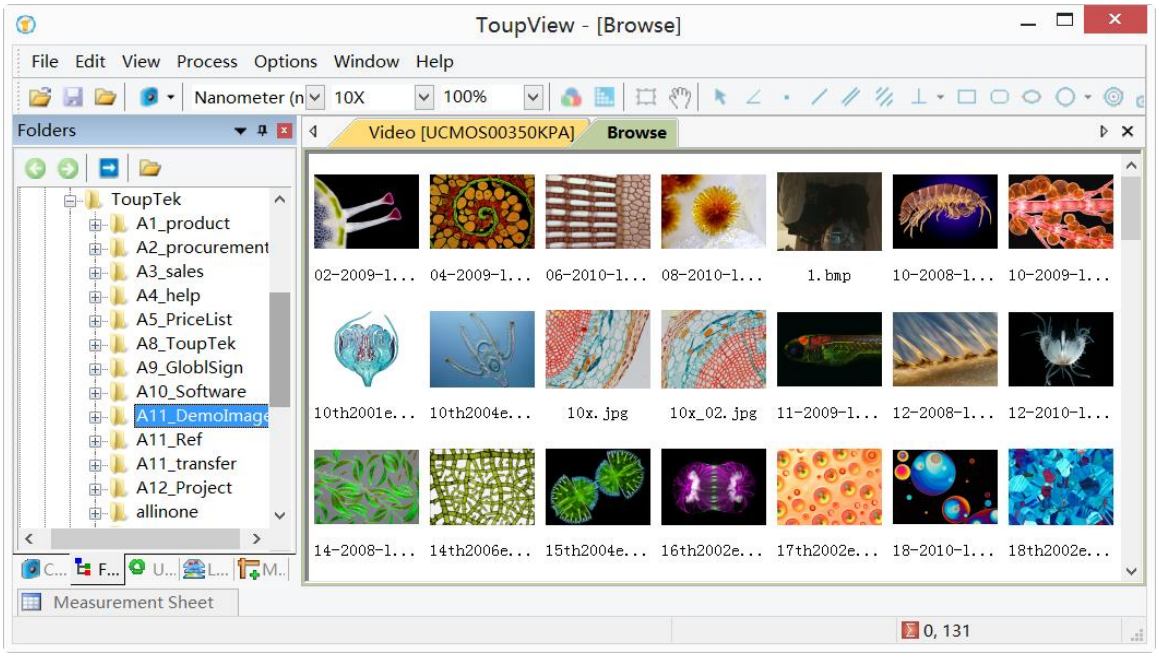
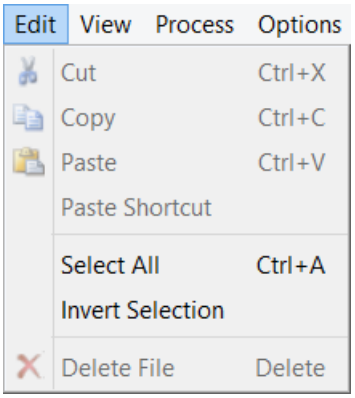


Fig.11

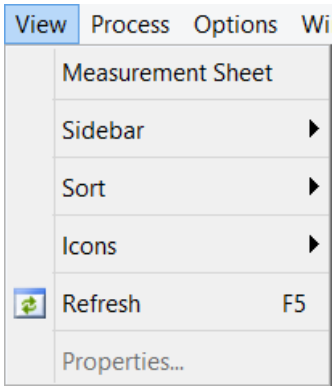
After creating the Browse window, ToupView will display the Browse window that looks like windows explorer. The child window on the left part of the Browse window called Folders Sidebar and can be used to

relocate the directory on the hard disk. Images in the current directory can be displayed in Large Icons or Small Icons mode on the right side of the Browse window upon your setting.

When the Browse window is active, the Edit and View menus will be changed to the following styles. There are shown as below.



The Edit menu(Fig.12)



The View menu(Fig.13)

These two menus can be used for the basic setting of the Browse window. For example, image file order can be set in Forward or Reverse format according to Sort by Name, Type, Size, Width or Height et al.

2.7 Close Windows

2.7.1 Close single Windows

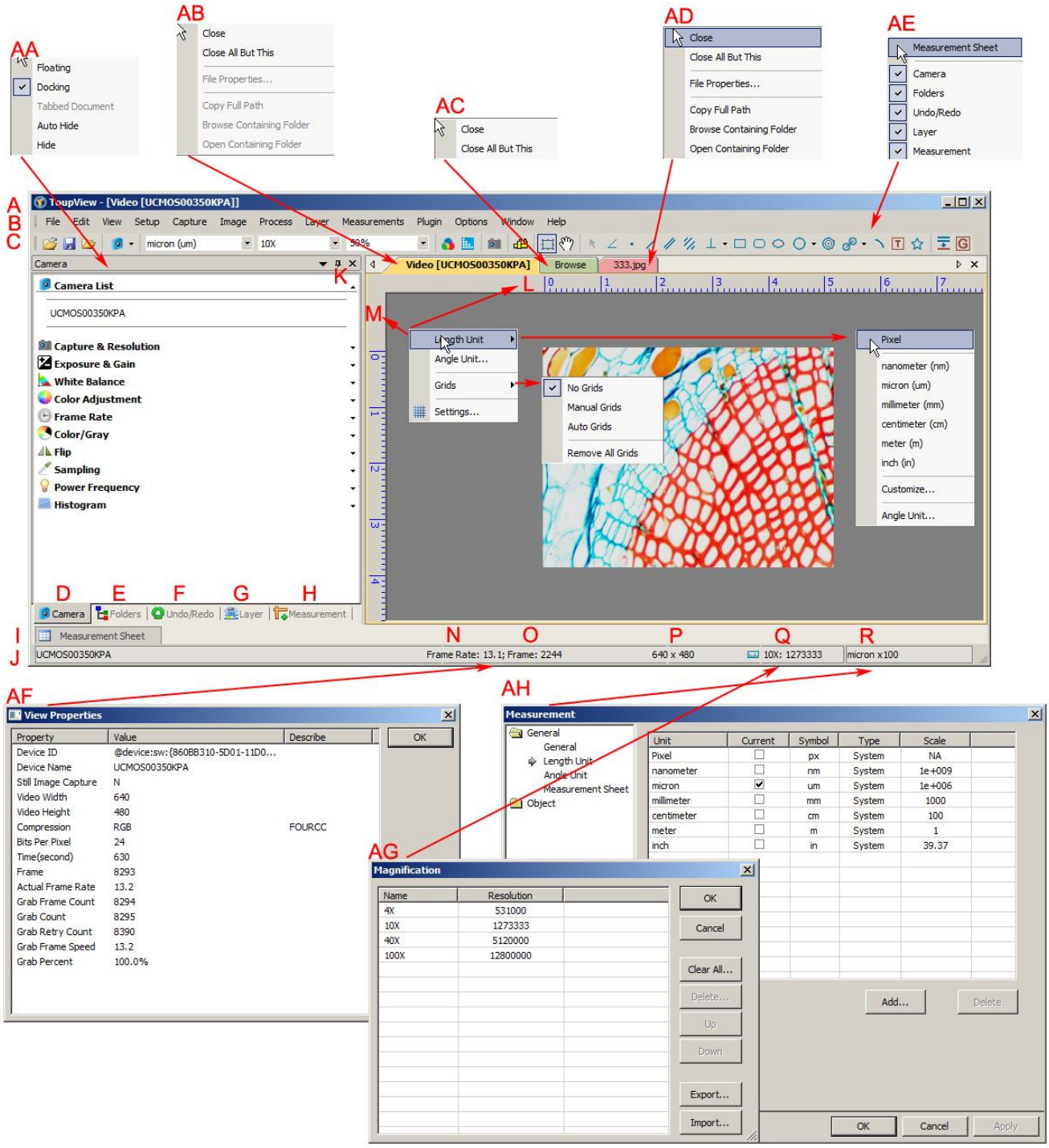
Click on the window top-left corner to close the corresponding or double-click the name of the window.

2.7.2 Close All

Choose Windows>Closes All menu to close all of the pictures opened or captured inside ToupView frame.

3 ToupView Windows GUI

3.1 Function GUI



A:ToupView; B: Menu;C:ToupView toolbar D:Camera Sidebar ;

E: Folders Sidebar ; F: Undo/Redo Sidebar ;G: Layer Sidebar ;

H: Measurement Sidebar ; I: Measurement Sheet; J:Statusbar;

K: Auto Hide button L: Horizontal ruler; M:Vertical ruler

N:Frame Rate O:Frames captured P:Current Video sizes

Q:Selected microscope Magnification R:Current Unit;

AA: Sidebar right mouse button context menu;

AB: Video window right mouse button context menu;

AC: Browse window right mouse button context menu;

AD: Image window right mouse button context menu;

AE: Frame window right mouse button context menu;

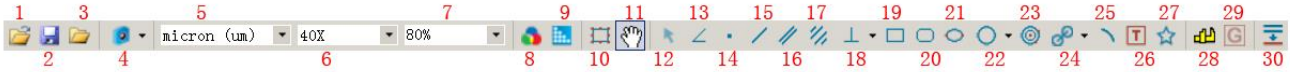
AF: Double-click bring up Video Properties dialog;

AG: Double-click bring up Magnification dialog;

AH: Double-click bring up Measurement dialog;

AI: Horizontal Ruler or Vertical Ruler right mouse button context menu

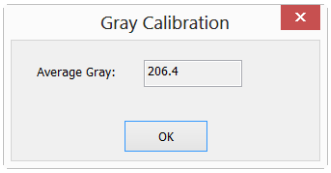
3.2 ToupView Toolbar



Item	Function	Item	Function
1	Open (Ctrl+O)	16	Parallel
2	Save(Ctrl+S)	17	Two Parallel
3	Browse(Ctrl+B)	18	Vertical
4	Camera List	19	Rectangle
5	Unit	20	RoundRect
6	Magnification	21	Ellipse
7	Zoom	22	Circle
8	Video Source Properties	23	Annulus
9	Video Stream Format	24	Two Circles
10	Video/Image Select	25	Arc
11	Track	26	Text
12	Object Select	27	Polygon
13	Angle	28	Calibration
14	Point	29	Gray Calibration
15	Line	30	Manual Fusion

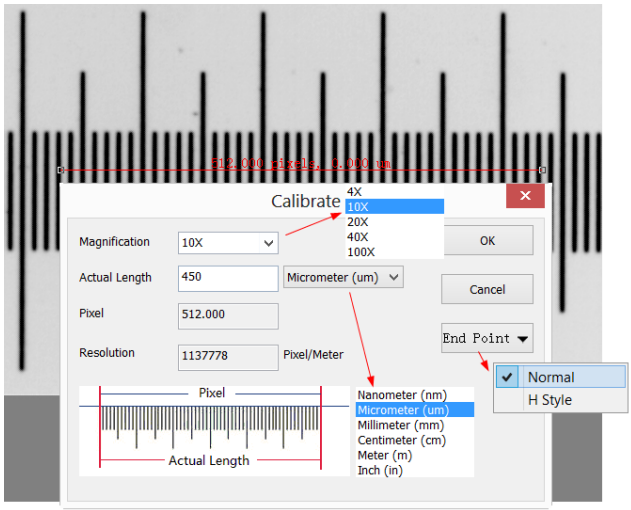
4 ToupView Practial Tool Kit

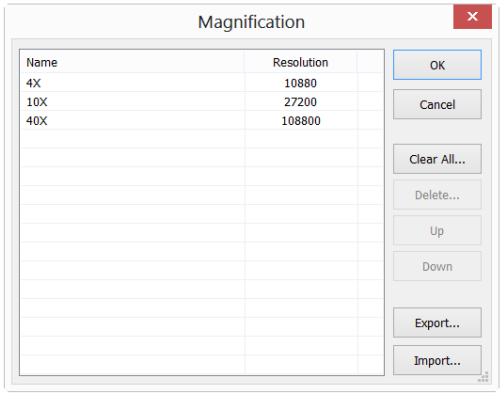
4.1 Luminance Calibration Tool

Control Dialog	
Function	◆ Switch the camera from the Auto Exposure mode to the Manual Exposure mode in the Exposure & Resolution group ◆ Use ROI Image Select button to select a ROI on the background ◆ Click Gray Calibration button on the toolbar and the above dialog appeared ◆ Adjust light source brightness to make the Average Gray value to the desired value
Initial Set	◆ Recommended Average Gray value: 190~205

4.2 Video or Image Calibration Tool

Control Dialog





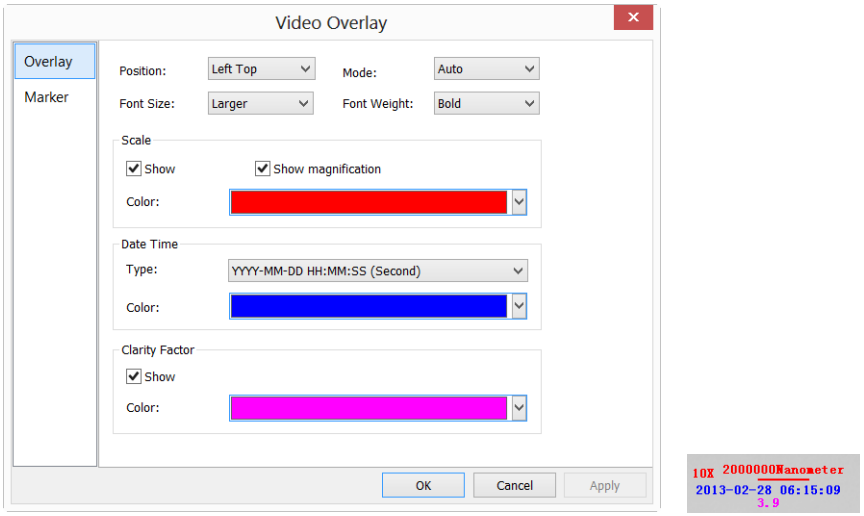
Function

- ◆ Set the Live Resolution to the maximum resolution in Capture & Resolution group
- ◆ Set the Zoom ratio to 100%
- ◆ Click Calibration button on the toolbar
- ◆ Drag the reticule to align the calibration tails
- ◆ Input the objective lens Magnification, Actual Length of the calibration tails, and then click OK button to end the calibration
- ◆ *The Export button is used to export the calibrations to a file. This will save the calibration parameters and can be Imported again for the future application

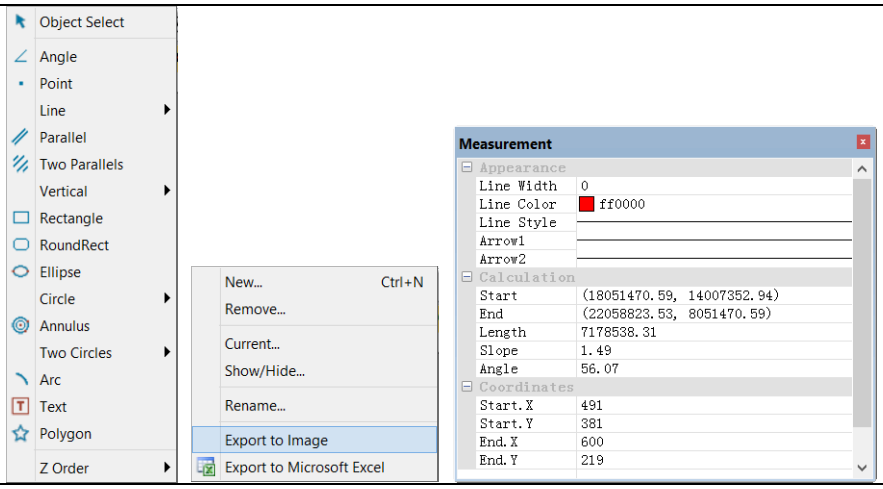
Initial Set

- ◆ *Make sure to use the right Magnification calibration file to match the actual lens' magnification

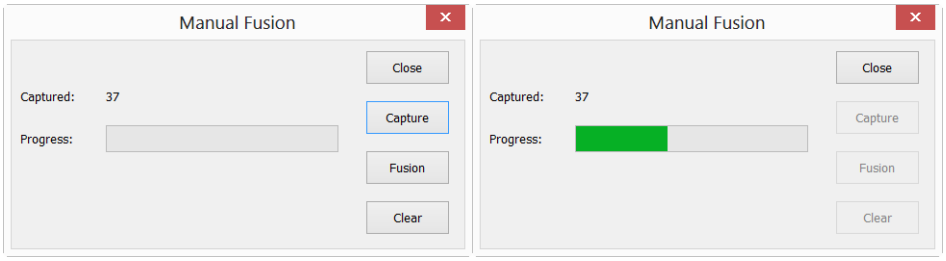
4.3 Video Overlay Tool

Control Dialog	
Function	◆ Choose Setup>Video Overlay menu to overlay the current Magnification, Scale Bar, Date Time and Clarity Factor on the video
Initial Set	◆ *The Overlays can be overlaid on the captured image by checking Capture with Marker and Watermarker box on the Options>Preferences>Capture dialog

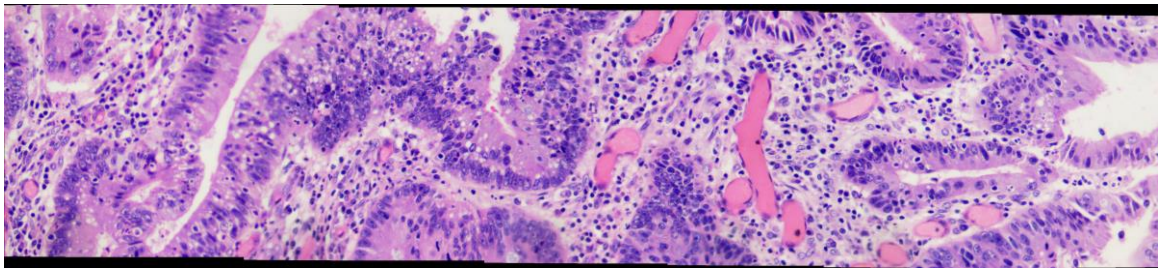
4.4 Video or Image Measurement Tool

Control Dialog	
Function	◆ Measurement tool includes common two-dimensional plane measurement command. Choose suitable tool according to specific application ◆ Click the measure anchor and click the left button of the mouse to finish the measurement. Click the right button of the mouse will abort the current measurement. The Measurement Object can be moved, deleted or modified by selecting it with the Object Select tool ◆ Choose the Export to Image in Layer menu to combine the Measurement Objects with the background image to form a new background image ◆ All the measure anchors are on a new layer over the background image, this will not damage the original image. After the object is selected, click Delete on keyboard to delete them
Initial Set	◆ The Object properties can be predifined by Options>Measuremen>General or Object page

4.5 Extending Depth of Field (EDoF) Tool

Control Group	
Function	◆ Click Manual Fusion on the toolbar and click Capture to capture the image for Fuse operation ◆ Finely and evenly adjust the Z-Axis and capture image once a time for each adjustment. Click Manual Fusion after finish capturing images. Wait for a while, and then a new EDoF image window will be created ◆ This EDoF extracts the clearest part from the different focal planes to take the place of the fuzzy part to obtain a clear image. Please pay attention to the changes of every adjustment and make sure that each image has a different clear part. To avoid the misalignment, please don't change the XY direction in the EDoF process.
Initial Set	◆ Make sure that each image should have a different clear part. It is not necessary to capture too many images. ◆ Rotate the fine knobe evenly along the same direction in the EDoF process ◆ Images without clear parts will make the final picture fuzzy

4.6 Video or Image Stitching Tool

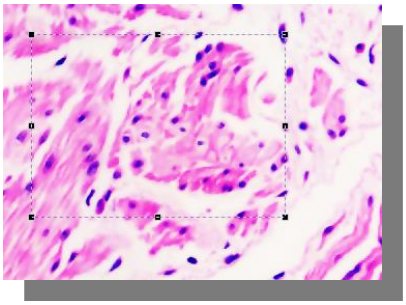
Control Dialog	 
Function	◆ Uncheck the Auto Exposure box to set the Exposure mode to Manual Exposure mode and make the image clear.

Initial Set

- Choose Process>Stitching ( ) menu , click Snap to capture image and then move the sample forward along a direction, click Snap and click capture again to repeat the operations until the end. After all the images have been captured, Click OK to begin image stitching process and after a while, a stitched image will be generated in a new window
- Make sure that the image brightness will not change significantly during the movement
- *Each moving distance should not exceed 75% of window content, which means that there should have 25% overlap region between every 2 adjacent images.
- Click Image Select button to select the desired area and click Image>Crop (Shortcut Key: Shift+C) to remove the ragged black edge (caused by the movement that is not in an extremely straight line). Finally, choose save to finish the image Stitching process.

4.7 ROI Image Select Tool

Control Dialog



Function

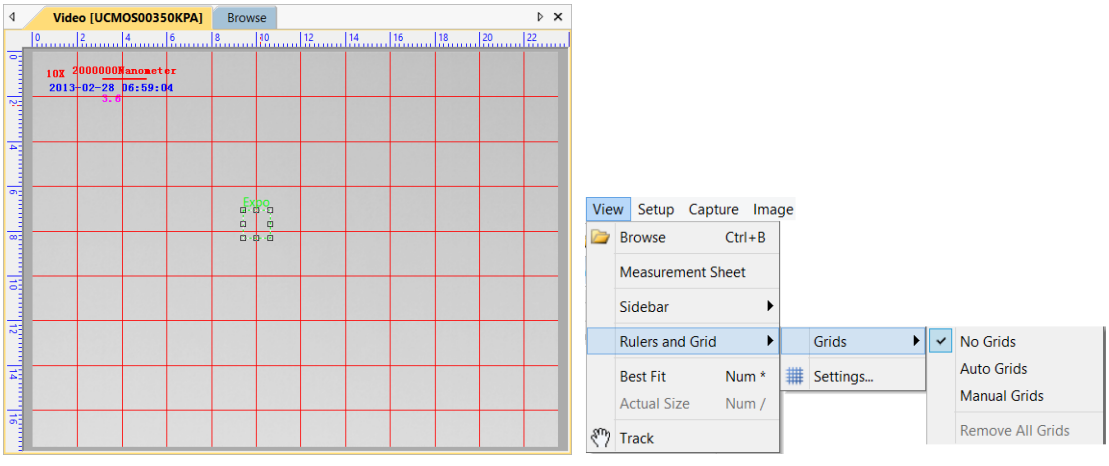
- Image Select button on the toolbar has many applications.
- Select a region in the video window and click Snap to obtain a selected ROI image
- Select a region in the video window and click Gray Calibration tool to calibrate the video gray to a desired value for the Luminance calibration.
- Select a region in the video window will enable the Copy button

Initial Set

- *Click Image Select button to activate it and click again to close it

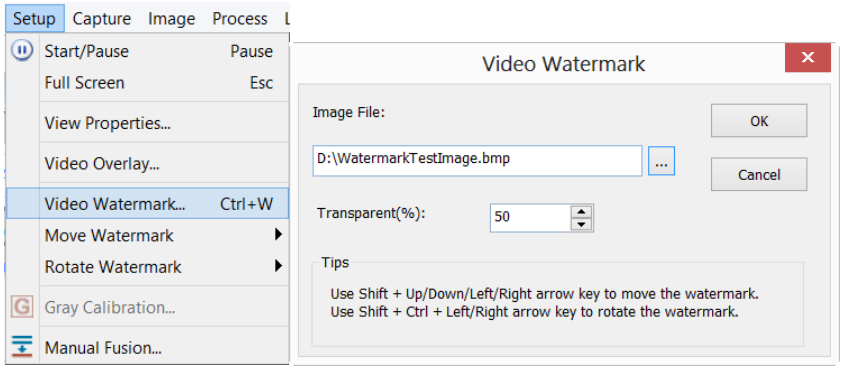
4.8 Video or Image Grid Tool

Control Dialog

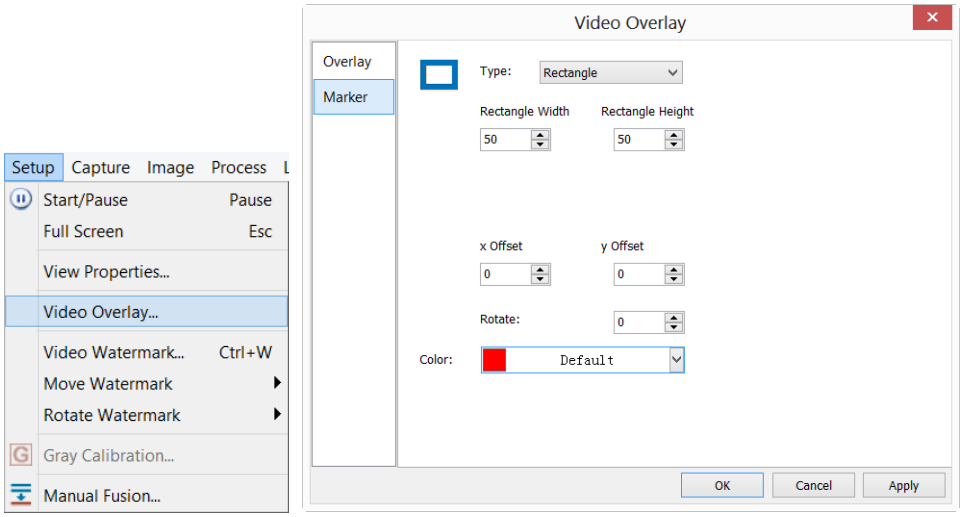


Function	◆ Operating method: Choose View>Ruler and Grid>Grids>Auto Grids menu ◆ It can be used as the virtual cell counting chamber. ◆ *Auto Grids: The grids density is changed according to the image resolution
Initial Set	◆ *Manual Grids: Drag the horizontal or vertical arrow at the top left of the window to a desired region manually will overlay the a grid line on the image.

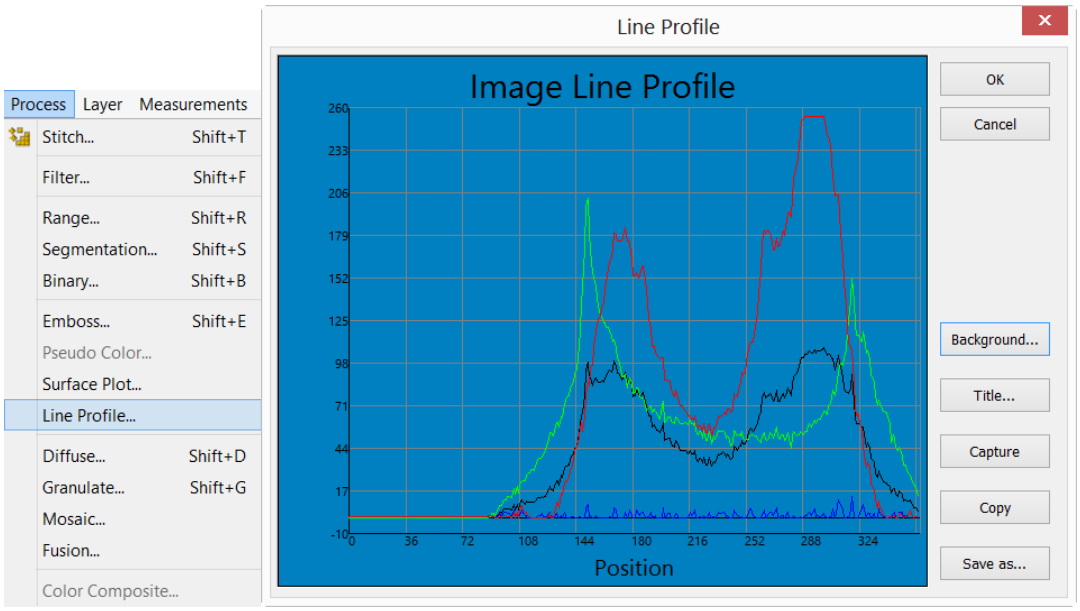
4.9 Video Watermark Tool

Control Dialog	
Function	◆ See the detailed information in Setup>Watermark section in the ToupView help file
Initial Set	◆ The watermark file must be in 24bits BMP ◆ To intensify the Watermark effect, the Watermark image could perform binary and invert processing. For example, if a ruler image is taken as the Watermark, you should binarize the ruler first and then invert the calibration tails, as a result, the black tails changed into white and the white background changed into black.

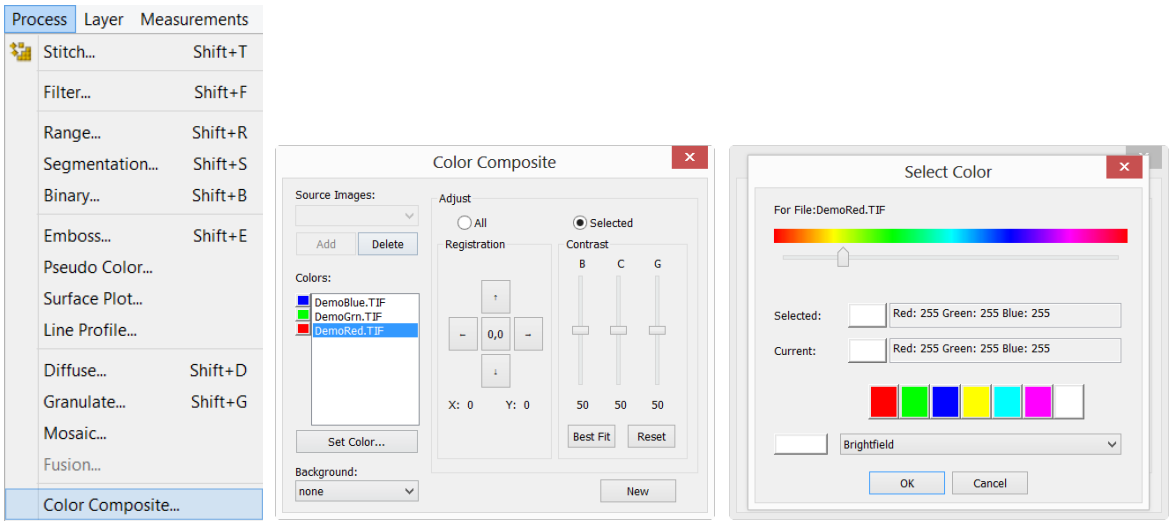
4.10 Video Marker Tool

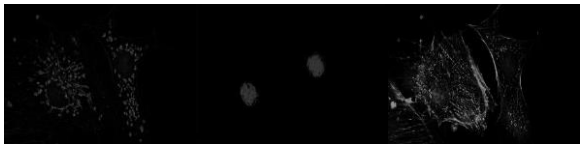
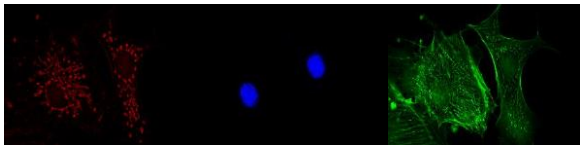
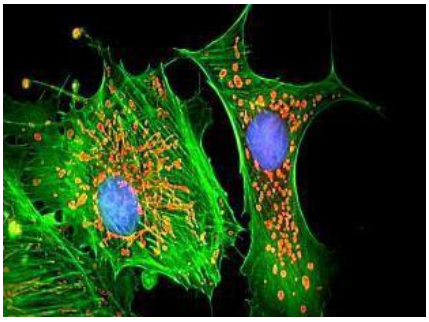
Control Dialog	
Function	◆ Operating method: Choose Setup>Video Overlay menu and click the Marker page
Initial Set	◆ * The Marker overlaid on the video window can be took as real Cross in the eyepiece

4.11Line Profile Tool

Control Dialog	
Function	◆ Operating method: Choose Process>Line Profile menu
Initial Set	◆ *Click the Line button on the toolbar to draw a Line, choose Process>Line Profile menu will invoke the Line Profile dialog. The R,G and B value under the line will be ploted in the Image Line Profile window. It reflects the linear brightness color value distribution under the Line at real time. The Profile line will changed according to the Line position or when the Line state

4.12Color Composition Tool

Control Dialog	
Function	◆ Operating method: Choose Process>Color Composite menu ◆ When and only when a gray image is available, the Color Composite menu will be enabled, so pls change the captured image to gray image first.
Initial Set	◆ *Choose the right color in the dye list according to the dye name and bring the grey image back to colorful. If the dye list do not have the required dye, please define it with the right color first

The Original Image		
Colorized by Pseudo Color		
Color Composited Image	◆ During the Color Composite process, select the images, adjust its brightness (B), contrast ratio(C) and gamma value (G) separately. Make sure that the size and content of the images fit well.	

5 ToupView Image Process Modules

5.1 Filter Shift+F

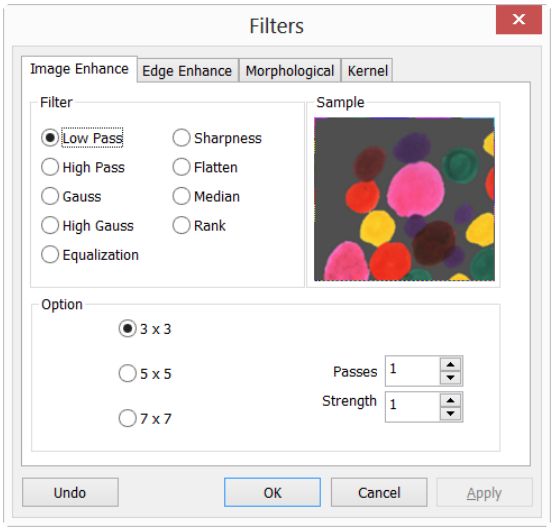
Operating Method: Choose Process>Filter Menu.

TouView provides various kinds of filters through which you can acquire ideal images efficiently. Generally, the filters are divided into two categories: Convolution filters and Non-convolution (Morphological) filters.

No matter what categories the filter is, different kernels take different effect on the filtered results despite the same filter category. ToupView also allows access to custom filter kernel so that satisfactory results can be achieved during image processing. The filter dialog involves four property sheets or tabs, each of which has its own filter. Either one you choose, you can find real-time effect in preview window. Click OK or Apply, filtered results are always written to the active image. The difference for these two buttons is, while writing results, click OK, dialog closed, click Apply, dialog remains. For the results that already written to images, Edit>Undo command will cancel the applied operations if you are not satisfied.

5.1.1 Filters: Image Enhance

Shown as below, this property page includes filters as follows:



Item	Description
Low Pass	◆ The Low Pass filter replaces the center pixel with the mean value in its neighborhood. Check this filter can soften image and remove noise by eliminating high-frequency information (this has the effect of blurring sharp edges)
High Pass	◆ The High Pass filter enhances high-frequency information by replacing the center pixel with a convolved value calculated from a certain kernel
Gauss	◆ Similar to Low Pass filters, Gauss filter can soften image by eliminating high-frequency information, but not as effective as Low Pass. It softens image with its Gaussian formula

High Gauss	◆ Similar to Sharpen filter, High Gauss enhances detailed information of images, but with less noise and a Gaussian curve type of kernel
Equalization	◆ The Equalization filter enhances image contrast based on the histogram algorithm
Sharpness	◆ The Sharpness filter enhances detailed information of images
Median	◆ Median filter removes impulse noise from an image. It first sorts out the neighborhood pixels according to luminance value, then replaces the current pixel with the Median value
Rank	◆ Similar to Median filter, Rank filter also removes impulse noise from an image. The pixels in the kernel are ranked by order of intensity, and the pixel in that range at the rank percentage is chosen for comparison. For example, in a 5x5 kernel, there are 25 pixels. A rank percentage of 95% would choose second-brightest pixel for comparison. If the difference between the selected pixel and the center pixel is greater than the threshold value, the Rank filter replaces the value of the center pixel with the value of the selected pixel

The functions of filters are in relation with the factors below:

To Image Enhance filters, the shape and size of kernel is of great importance;

To Equalization filters, their options relate to histogram Equalizations, among them is Local Histogram Equalization which modifies the contrast of an image based on the pixel values in a small window surrounding each pixel

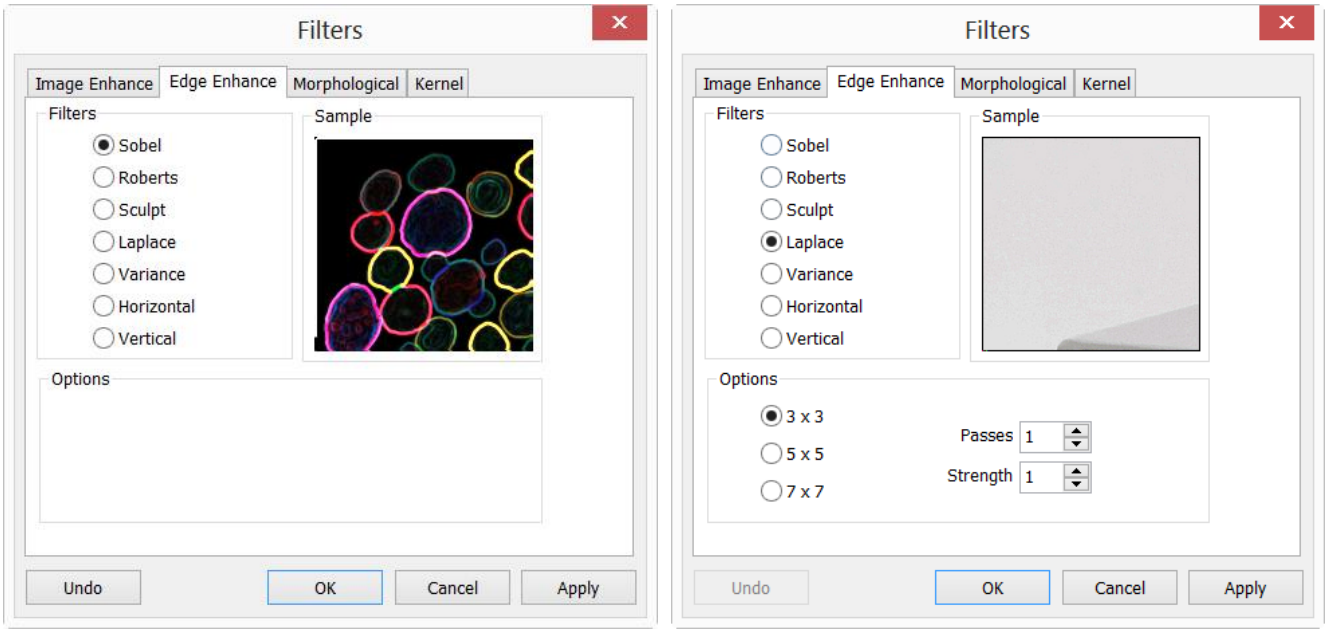
Item	Description
3x3	◆ Check 3 x 3 kernel will produce a more subtle filtering effect
5x5	◆ Check 5 x 5 kernel will produce a moderate filtering effect
7x7	◆ Check 7 x 7 kernel will produces a more extreme filtering effect
Passes	◆ Filter applied times on the image. Each operation is based on the results of previous operation. So more times applied, more amplified the effect will be
Strength	◆ Applied value reflecting how much of the filtering effect on the image. The range is from 1 to 10. Value 10 specifies the full strength (100%) of the filtered result applied to each pixel. Value 1 indicates that only 10% of the difference between the filtered pixel value and the original pixel value should be applied
Rank	◆ This value specifies which pixel in the sorted array will be used to replace the center pixel. Pixels in the array will be sorted in ascending order. The pixels are indexed from 0 to Kernel Size x Kernel Size-1. In the pixel index 0 corresponds to the lowest pixel value ◆ The Rank will be specified in terms of a percentage of the indexes (Kernel Size x Kernel Size-1). 0% rank means the lowest index (lowest gray value), 50% Rank means the middle of the array. and 100% rank means the highest index (highest gray value)

The Equalization filter enhances image contrast based on the histogram algorithm, it has the following options.

Item	Description
Local Histogram Equalization	◆ Local Histogram Equalization equalizes an entire image or partial image according to the size of window
Window	◆ Image pixels statistics (min, max, histogram, mean, standard deviation, etc.) will be calculated on a small Window of the image. These measurements are then used to derive the local contrast for that area of the image. In short, an area of Window x Window around each pixel is all that is considered when modifying the intensities in the image. Larger Window produces smoother results, while small Window track small details more closely
Best Fit	◆ Choose Best Fit command to optimize the values for the particular image. The results are achieved by stretching the local histogram to maximize the contrast between the brightest and darkest pixels in the local window region
Linear	◆ This option distributes the histogram linearly across the intensity scale. This function produces a high contrast image with the highest possible dynamic range
Logarithmic	◆ This option concentrates the histogram at the low end of the scale. This function produces a high contrast image with little dynamic image. It will tend to darken the image overall. It is useful for increasing the contrast in a very light image
Exponential	◆ This option concentrates the histogram at the high end of the scale. This function produces a high contrast image with little dynamic image. It will tend to lighten the image overall. It is useful for increasing the contrast in a very dark image

5.1.2 Filter: Edge Enhance

Shown as below, this property page includes filters as follows:



Item	Description
Sobel	◆ Check this filter to enhance the principal edges in an image. (The Sobel applies a mathematical formula to a 3x3 neighborhood to locate and highlight its edges)
Roberts	◆ Check this filter to enhance fine edges in an image. The Roberts filter is not a convolution filter. It applies a mathematical formula upon a 4 x 4 neighborhood to produce its effect. The upper left pixel in the neighborhood is the one that is replaced
Sculpt	◆ Check this filter to apply a sculpted effect on the image
Laplace	◆ Select this filter if you want to enhance all the edges in an image
Variance	◆ Select this filter if you want to detect and emphasize edges and textures. The Variance filter substitutes a pixel with the standard deviation for its neighborhood
Horizontal	◆ Check this filter to detect and emphasize horizontal edges
Vertical	◆ Check this filter to detect and emphasize vertical edges

If one of the Edge filters (Laplace, Variance,Horizontal and Vertical Edge filters) has been checked, the options will relate to kernel size, passes, and filtering strength. The following options will be displayed

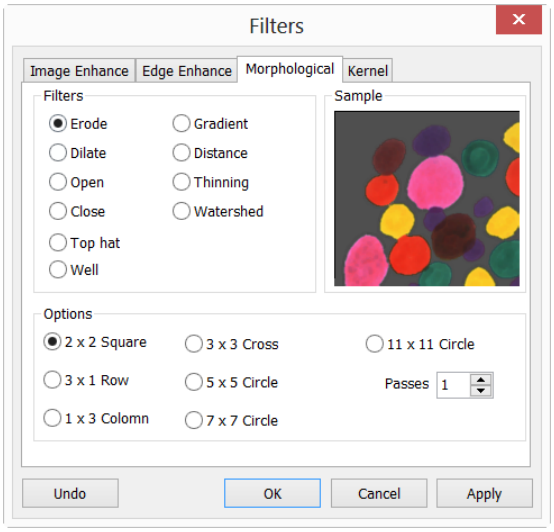
Item	Description
3 x 3	◆ Check 3x3 kernels to produce a more subtle filtering effect
5 x 5	◆ Check 5x5 kernels to produce a moderate filtering effect
7 x 7	◆ Check 7x7 kernels to produce a more extreme filtering effect
Passes	◆ Enter the number of times that the filter will be applied to the image. When a filter is applied multiple times, its effect is amplified by each pass. An image that has been softened by one pass of the Image Enhancement Filter, will be softened further by a second pass
Strength	◆ Enter a value from 1-10 that reflects how much of the filtering effect to apply to the image. A value of 10 specifies that the full strength (100%) of the filtered result will be applied to each pixel. Values less than 10 cut the full weight of the filter - a value of 1 indicates that only 10% of the difference between the filtered pixel value and the original pixel value should be applied, a value of 2 indicates that 20% of the difference should be applied, and so forth

Note: If you have selected Sobel, Phase or Roberts, no options are available.

If you have selected Variance, the Passes and Strength options are not available

5.1.3 Filters: Morphological

Shown as below, this property page includes filters as follows:



Item	Description
Erode	◆ Check this morphological filter if one wants to modify the size of objects in the image. The Erode filter erodes the edges of bright objects and enlarges the edges of dark ones
Dilate	◆ Check this morphological filter if one wants to modify the size of objects in the image. The Dilation filter dilates bright objects and erodes dark ones
Open	◆ Check this morphological filter if one wants to modify the shape of objects in the image. Assuming the image contains bright objects on a dark field, the Open filter will smooth object contours, separate narrowly connected objects, and remove small dark holes
Close	◆ Check this morphological filter if one wants to modify the shape of the objects in the image. Assuming the image contains bright objects on a dark field; the Close filter will fill gaps and enlarge protrusions to connect objects that are close together
Tophat	◆ Check this filter to detect and emphasize points, or grains, that are brighter than the background. There are 3 kernel sizes for this processing. Click the radio button to change the kernel size to the value that most closely matches the size of the grains to detect
Well	◆ Check this filter to detect and emphasize points, or grains, that are darker than the background. There are 3 kernel sizes for this processing. Click the radio button to change the kernel size to the value that most closely matches the size of the grains to detect
Gradient	◆ Check this filter to enhance edges in an image
Watershed	◆ Check this filter to separate objects that are touching. The Watershed filter erodes objects until they disappear, then dilates them again, but will not allow them to touch. The Watershed filter will not operate upon True Color images. If one wants to separate objects in a True Color image, he must first convert it to Gray Scale (see : Image>Gray Scale)
Thinning	◆ Check this filter to reduce an image to its skeleton. When choosing this filter, one must set the threshold that determines whether a pixel is part of the subject, or part of the background (see Options

	below). The Thinning filter will not operate upon True Color images. If one wants to thin a True Color image, he must first convert it to Gray Scale
Distance	◆ The Distance filter is used to show the distances of pixels within blobs to the outer boundaries of those blobs. After applying the distance filter, the background will be black (i.e. pixels with value 0). Only the area within the blobs will have non-zero values (will be white). The values of each pixel within the blob will be a count of the shortest distance from that pixel to the edge of the blob. Thus, all pixels along the blob's border will have a value of 1 (since they are one pixel away from the edge of the blob); pixels that are a distance of 2 from the border will have the value 2, and so on. This creates a distance map of the image. The Distance filter will not operate upon True Color images. If one wants to use the Distance filter with a True Color image, he must first convert it to Gray Scale

If Erode, Dilate, Open, or Close filters is checked, the options will relate to the kernel size and shape. The following options will be presented:

Item	Description
2 x 2	◆ Check to use the 2x2 square kernel configurations
3 x 1 Row	◆ Check to use the 3x1 row kernel configuration
1 x 3 Column	◆ Check to use the 1x3 column kernel configuration
3 x 3 Cross	◆ Check to use the 3x3 cross kernel configuration
5 x 5 Circle	◆ Check to use the 5x5 circular kernel configurations
7 x 7 Circle	◆ Check to use the 7x7 circular kernel configurations. This is a two-pass filter, accomplished using a 5 x 5 circle followed by a 3x3 cross
11 x 11 Circle	◆ Check to use the 11 x 11 circular kernel configurations. This is a three-pass filter, accomplished using a 5 x 5 circle followed by another 5 x 5 circle, followed by a 3 x 3 cross
Passes	◆ Set the number of times iterate the filter

If the Tophat, Well, or Gradient filter is selected, the options will relate to kernel size and shape. The following options will be presented:

Item	Description
3x3	◆ Check to use the 3x3 square kernel configurations
5x5	◆ Check to use the 5x5 square kernel configurations
7x7	◆ Check to use the 7x7 square kernel configurations

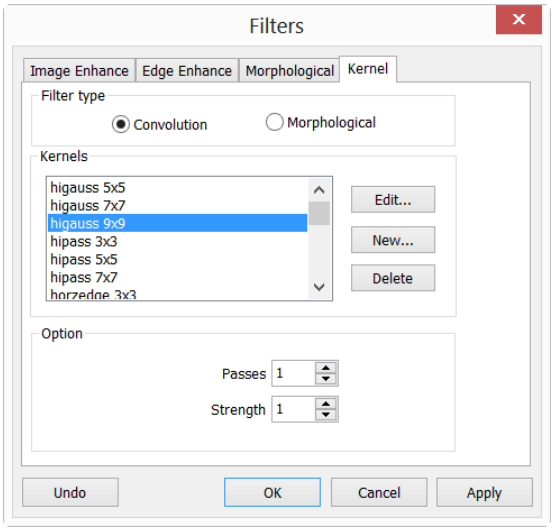
If Distance, Thinning, or Watershed filter is checked, the options will relate to the threshold. The following option will be presented:

Item	Description
Threshold	Enter a percentage value from 1-100 that specifies the intensity value to Threshold binarize the

	image. For example, a Threshold of 50% on a Gray Scale image would set all values ≤127 to 0 (black) and all values ≥128 to the maximum value for that image class (white)

5.1.4 Filter: Kernel

The Kernel page allows editing kernel files for both Convolution and Morphological filters. The dialog shows as below:



Note: The HiPass, LoPass, Laplace and Unsharp kernel files are used by the HiPass, LoPass, Laplacian and Sharpen options listed in the Filter window (i.e., there is no difference between selecting one of these kernel files and selecting its option button in the Filter window -- the two methods ultimately do the same thing). Because these kernel files are essential to the operation of these filtering options, they must not be deleted or renamed.

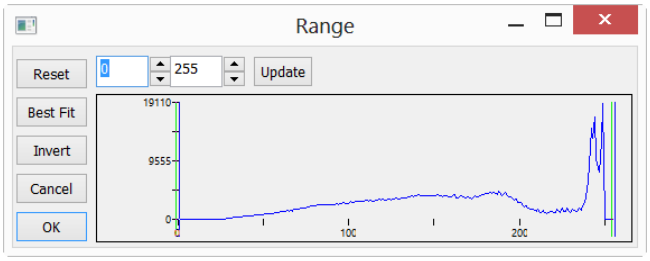
Item	Description
Filter type	◆ Check to modify the kernel for a selected Filter type, either Convolution or Morphological filters
Edit	◆ Name :This list box contains the name of the selected kernel file. If one wants to save the modified kernel file to the same file,leave it as it is. If one wants to save the file to a new location, enter the new filename here
	◆ Kernel Size: Click the spin buttons or enter the number to change the size of the kernel. Either direction may take into account one to nine pixels. As one modifies the Kernel Size, the shape of the kernel representation changes accordingly. In the center of the dialog, there are white boxes containing coefficients that will be multiplied with each pixel that will be taken into account by the filter kernel. One can change any coefficient by clicking on it and adjust it as desired
	◆ Fill: Click this button to fill every element of the kernel with a particular value. The Fill kernel dialog appears. One may enter a value between 0 and 10. Using the Fill button is useful for setting all coefficients to the same value. One may then change the coefficients that require a different value
	◆ Offset: The pixel whose value is being modified is usually the center-most pixel. One may, however, designate any pixel. ToupView signals the pixel to be changed by putting a box around it. Choose X

	and Y Offset spin buttons to apply
New•••	◆ Click to create a new filter kernel. The Edit Kernel dialog will appear. The functions of the dialog are the same way as the dialog for Edit••• described above), with the exception that the file name for the new kernel file must be provided
Delete	◆ Click to Delete the selected filter kernel file

5.2 Range••• Shift+R

Operating method: Choose Process>Range menu

The Range command allows set the intensity levels of the image to increase the contrast and enhance the display in low-light situations.



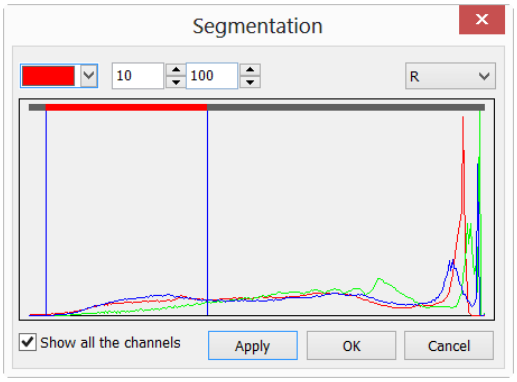
Item	Description
High & Low end	◆ The Range dialog shows the Histogram of current image on which two vertical marks stand for high and low end of strength. The cursor can move the marks. While looking at a colorful image, the Histogram will show red, green and blue colors through red line, green line, blue line respectively
2 Edit Controls	◆ The edit controls specify values of strength extreme. Click the up or down arrow on the spin button can increase or decrease the value. Those values that from 0 to low end are black and the value that ranges from high end to maximum of scale is white
Reset	◆ The Reset button allows to reset the black and white levels to the high and low ends of the dynamic Range. Reset only has effect on the displayed range, Reset all functions will display original settings
Best Fit	◆ The Best Fit button automatically sets the intensity levels to the Best Fit. It instructs ToupView to optimize the brightness and contrast values for the particular image
Invert	◆ The Invert button reverses the color of the image
Update	◆ Update will refresh the display Histogram of the current dialog

5.3 Segmentation••• Shift+S

Operating method: Choose Process>Segmentation menu.

Segmentation process is a Histogram based models for identifying certain colors in the segmented range. The segmented range can either be selected by two vertical bars with mouse, or directly editing value through the two

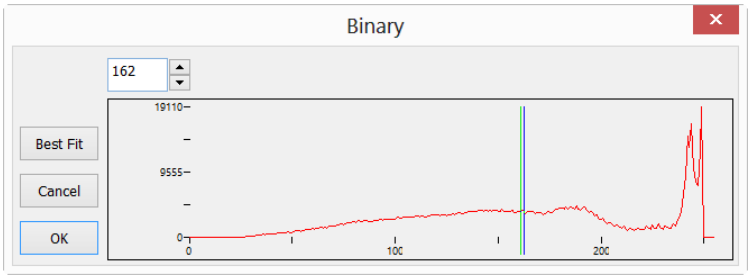
edit controls. The colors used are specified by the system palette. For the 24 bit true color image, the Segmentation operation can be performed in either Red(R), Green(G), or Blue(B) channel separately.



5.4 Binary••• Shift+B

Operating method: Choose Process>Binary menu.

Binary is a kind of gray level process. If the gray of the pixel is greater than the given threshold, the pixel's color will be changed into white. Otherwise, black. After this process, the image turns out to be dichromatic image with only black and white color. Although the process may lose some information, it is an indispensable step of some processes.

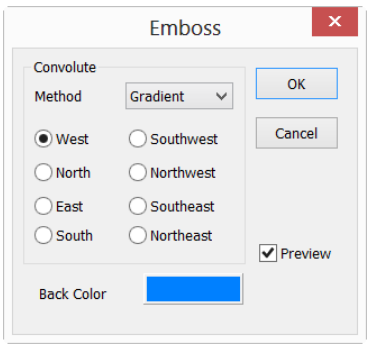


The curve on the Binary dialog shows different gray levels of the image. The line in the dialog indicates the threshold value. To change the value, you can drag it to change the threshold, or change the number in the Edit control on the dialog.

Click the Best Fit button to apply the auto threshold process to the image. The process offers an automatic threshold, click Best Fit can help make the image Binary.

5.5 Emboss••• Shift+E

Operating method: Choose Process>Emboss menu



Emboss is a kind of artistic process, which makes the image look like an empaistic image. The Preview button in Emboss dialog allows previewing the image before creating it. The process supplies 3 kinds of convolutions including Gradient, Different, and Prewitt. There are 8 directions for each convolution method. Users can get different effects with different convolution methods or directions.

5.6 Pseudo Color•••

Operating method: Process>Pseudo Color menu.

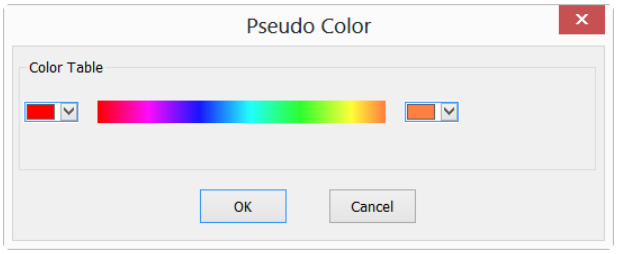
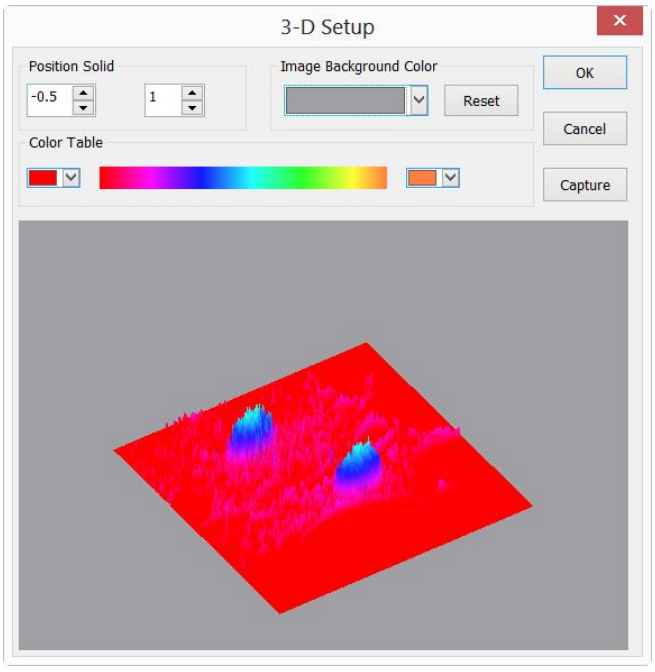


Image must be in Gray mode. Pseudo Color command colorizes the active monochromatic image so as to highlight certain features in a gray scale image. The command does not modify the pixels' values in image bitmap (it does not convert image to true color or palette,), but creates a special palette with which the monochromatic image is displayed. It simply associates a Pseudo Color palette with the image that interprets the gray-level values in the image as color.

To select the start and end colors of the range, please click the buttons at each end of the color strip separately to bring up the color dialogues. The set result displays at the middle gradient bar.

5.7 Surface Plot•••

Operating method: Choose Progress>Surface Plot••• menu.

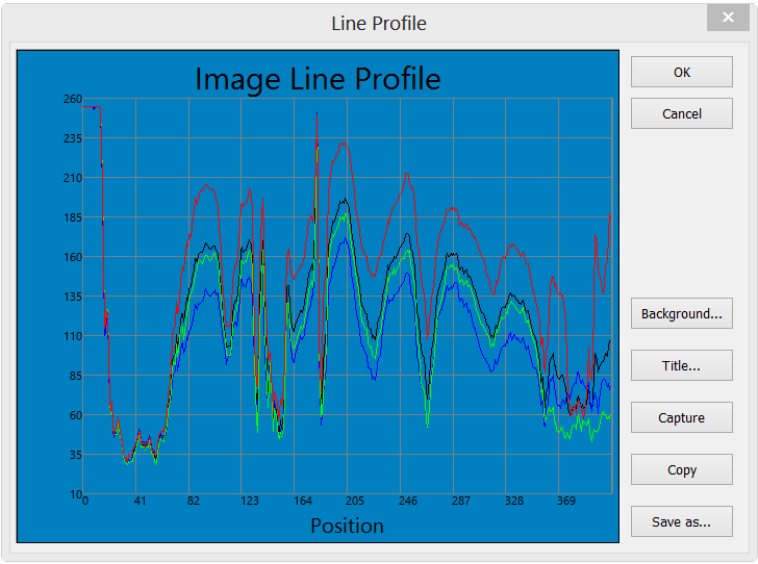


This command tool reflects the image intensity values intuitively as a 3-D, while in 3-D coordinate, X axes represents length, Y axes represents width, Z axes represents brightness. The rendering effect can be achieved in the preview window, and image position can be drawn in the window by adjusting the mouse.

Item	Description
3-D Preview Window Direction	◆ Setting the edit box on the left side can adjust the 3-D surface plot position in the preview window, the default value is -0.5 ◆ Setting the edit box on the right side can adjust the relative. It's default value is 1
Image Background Color	◆ Adjust the preview window Image Background Color by activating the Color dialog box system
Capture	◆ Capture the active image in the viewpoint window as a new image
Color Table	◆ Choose an appropriate color to display the different gray values in this table. Click the left color button to set the start color value, click the right color to set the end color value, the intermediate color bar displays the changes between the start point color and the end point(the relative information can be referred as color)
Reset	◆ Set the Position Solid's two edit controls to their default values

5.8 Line Profile•••

Operating method: Choose Process>Line Profile menu.



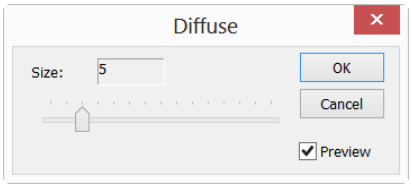
This tool illustrates how pixels along a selected line are distributed by graphing the number of pixels at each color intensity level. In a Line Profile, the X-axis represents the spatial scale, and the Y-axis represents the intensity values which range from 0 to 255.

Item	Description
Background	◆ Invoke the windows Color dialog to set the Background Color of the profile window.
Title	◆ Use this command to set a Title on the Line Profile image

Capture	◆ Capture the image in the Line Profile window as a new untitled image.
Copy	◆ Copy the Line Profile window's content onto the clipboard.
Save as	◆ Save the Line Profile image in bmp format.

5.9 Diffuse•••Shift+D

Operating method: Choose Process>Diffuse menu.

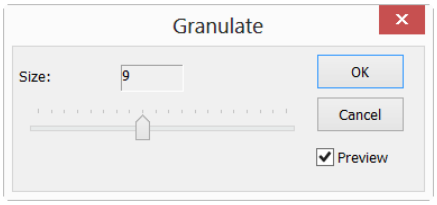


Diffuse is a kind of artistic process. It can diffuse the image. Users can adjust the parameter in the dialog to control the degree of the diffusion. Value range: odd number between 1~30.

Item	Description
Size	◆ Illustrate the diffuse degree, default value:1,Range:1~29
Preview	◆ Check it to display the real-time effect when drag the slider bar

5.10 Granuate•••Shift+G

Operating method: Choose Process>Granuate menu



Granuate is a process that can make the image blur. User can change the degree of image blurring, the value range:1~20.

Item	Description
Size	◆ Illustrate the Granuate size, default value:1,Range:1~20
Preview	◆ Check it to display the real-time effect when drag the slider bar

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