

**OLYMPUS**<sup>®</sup>

Your Vision, Our Future

Digital Microscope

**DSX510/DSX510i**

Discover Another Dimension

**NEW**



**DSX510**



**DSX510i**

# For All Conventional Microscope Users, This Is an Olympus Proposal for the Next Generation of Microscopes.



Olympus introduced the world to a new dimension in industrial microscopy with the DSX Series digital microscope system. Today, with the unique combination of time-tested Olympus optics and today's newest digital imaging technology, the Olympus DSX Series sets a new standard in industrial microscopes. The Olympus DSX Series digital microscopes allow even first-time users to immediately produce superior images and highly reliable results, thanks to even more advanced features and an even simpler interface. No matter how big the challenge, DSX delivers the solution.

## The DSX510 Provides Observation, Image Capturing, Measurement, and Sharing — All in One.

### Efficient Observation

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Thanks to higher-quality optics and more advanced digital technology, the DSX510 delivers efficient observation, intuitive magnifying operation, a variety of observation methods, and reproducibility.

### Easy Image Capturing

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Various image capturing methods provide easy, intuitive operation — as simple as using a smartphone or tablet. Options include EFI and 3D imaging, wide area image capturing, movie capturing, and programmed image capturing.

### Accurate Measurement

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Live, 2D, and 3D measurement options are backed by guaranteed accuracy and repeatability, automatic calibration, and reproducibility self-check. Measurement can also be automated with a simple wizard function.

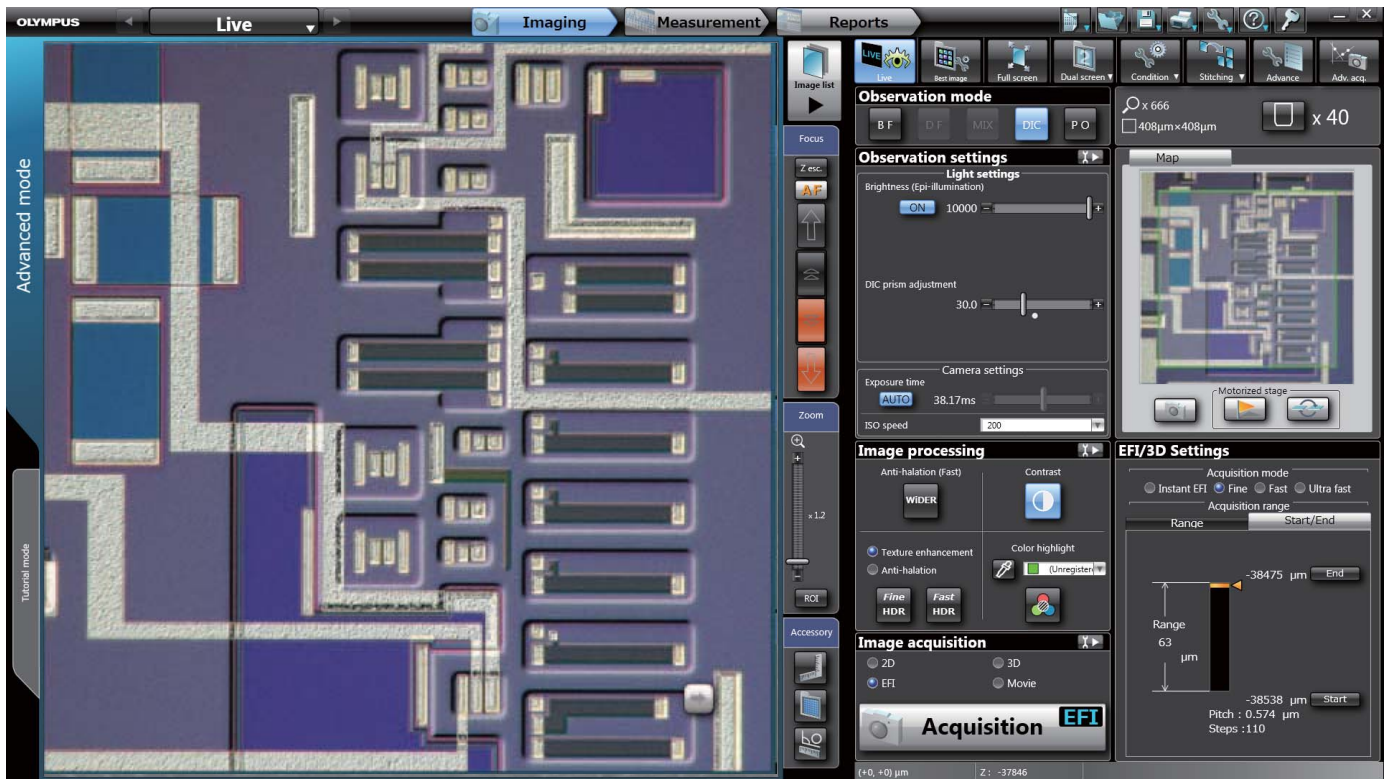
### Easy Sharing

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A well-designed reporting system allows easy sharing of measurement and analysis results. Reports can be created with one click, then exported to a variety of formats.

# Efficient Observation

More to See. Easier to Use.



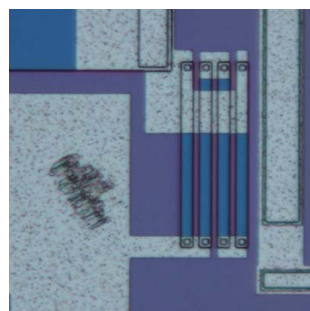
Made possible by the unique combination of Olympus optics and today's newest digital imaging technology, the DSX510 digital microscope is the culmination of a long history of superior engineering, design, and manufacturing. The microscope minimizes glare, delivers accurate color reproduction, and eliminates flare and distortion. Every sample is reproduced with such accuracy that it's simply stunning, and stunningly simple. Take a closer look at the DSX510, and see what other digital microscopes cannot.

# Technology that Reveals What Couldn't Be Seen Before

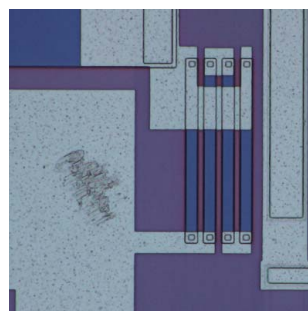
## High NA — Low-Aberration Field Lenses

With lenses that have higher NA and lower aberration than current digital microscopes, plus improved evenness of light intensity, the DSX510 series of digital microscopes offer high resolution equal to the very best light microscopes. DSX510 lenses deliver the longest working distance in the class, and enables observance of highly uneven samples as well.

\*Comparison of lens performance at similar magnification



IC chip (Objective lens NA 0.4)



IC chip (Objective lens NA 0.8)



Bainite (Objective lens NA 0.4)



Bainite (Objective lens NA 0.8)

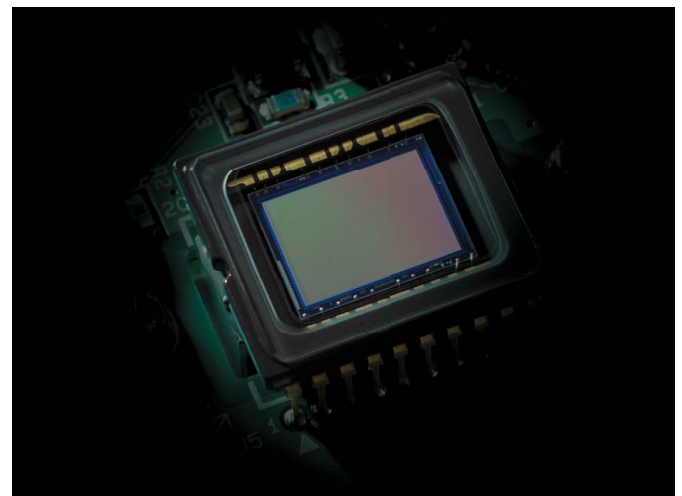
## LED Illumination: Picture-Perfect Inspection, Reduced Energy

With the advanced LED illumination of DSX510, color does not change with the LED's intensity, minimizing the need for white balancing, which is required with conventional light sources. This not only ensures accurate observation, but also helps reduce operating costs. Long LED working life makes the instruments virtually maintenance-free.

## High-Resolution 18MP Images Reproduced with High-Performance CCD\*

Olympus's high-performance CCD is the engine that shows exactly what our high-quality optics reveal. Our image shift function ensures high fidelity with fine detail processing, so clarity extends from corner to corner. Features include a Full HD camera and HDR digital processing.

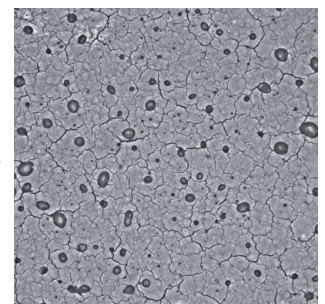
\*4800 x 3600 pixels, 3CCD mode conversion triples the pixel count



High-performance CCD



Glossy paper

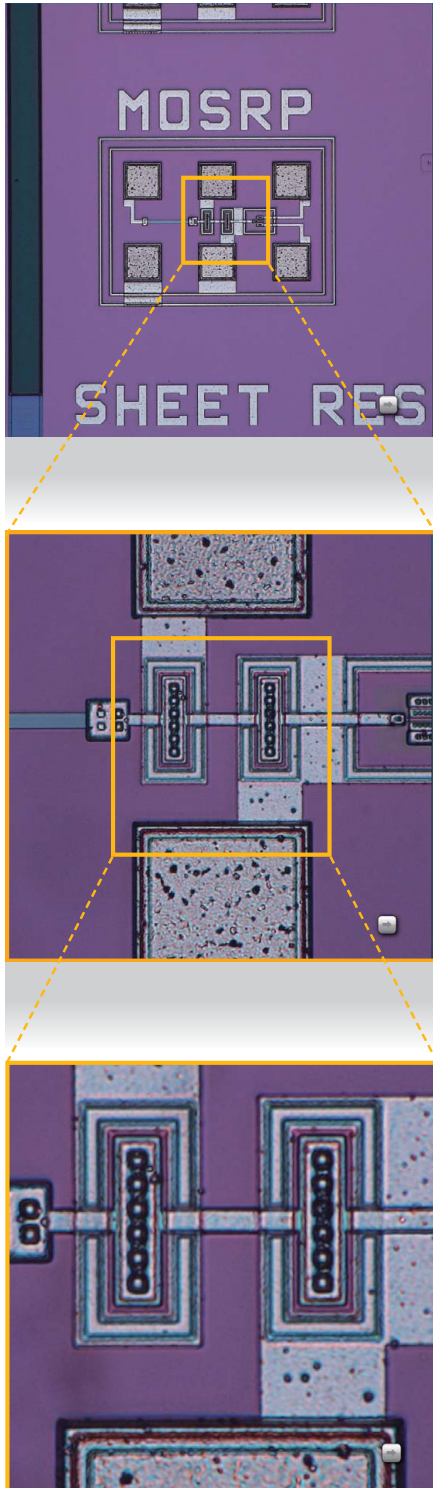


Glossy paper (HDR)

# Zoom Optics Cover a Wide Range of Magnification

## Optical Zoom: Get Closer to the Sample

Change the magnification to fit requirements — the DSX510 offers optical zoom of up to 13X and digital zoom of up to 30X. A single optical lens can cover the typical magnification range of conventional light microscopes.



Zoom in on the sample

## Nosepiece

Two lenses can be mounted at once for an even greater magnification range (70X to 9000X maximum range). When switching lenses, the DSX510 automatically adjusts magnification so the viewing area size remains the same.

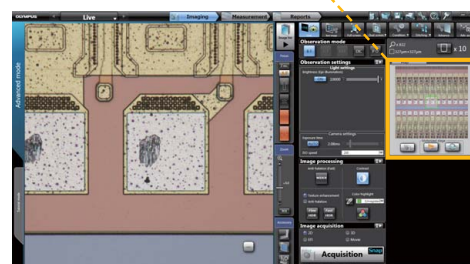


## Macro Map: Always Know the Location

As zoom magnification is adjusted to a higher level, the area seen at one time is reduced — Macro map automatically records a full field-of-view image in a separate macro window. On this full field image, location on the sample is noted and updated while moving along the sample. If using the panorama function, it will also be displayed in a macro window to provide the same convenience on an even larger area.



Macro map:  
Always know the location



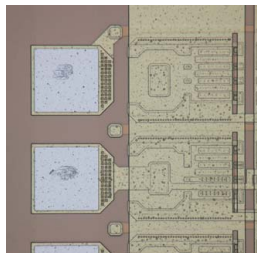
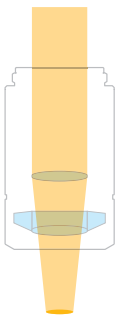
# A Variety of Observation Methods, Freely Usable

## Quickly and Easily Acquire the Images Required for Observation

Ideal for any industrial microscopic observation method, the DSX510 offers a variety of observation modes that deliver the high-resolution images users expect from high-end optics.

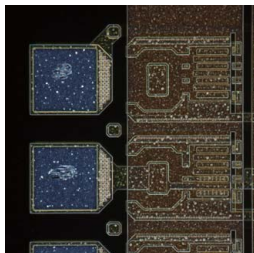
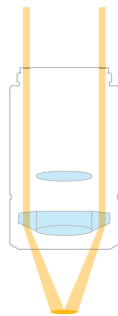
### BF

Brightfield observation — the most common microscopic observation method.



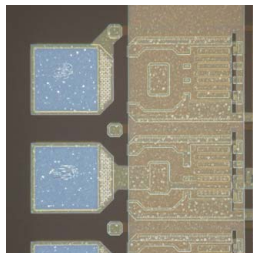
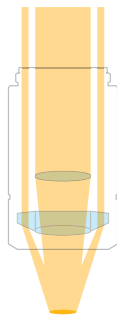
### DF

Darkfield observation — the best way to identify defects. Illuminate images from the side to emphasize imperfections.



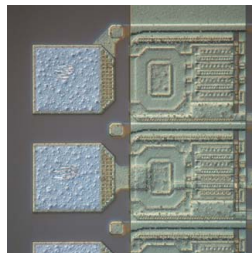
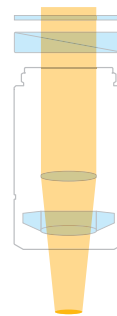
### MIX (BF + DF)

Use BF and DF at the same time, combining the best of BF ease of observation with the specific emphasis of DF defect observation.



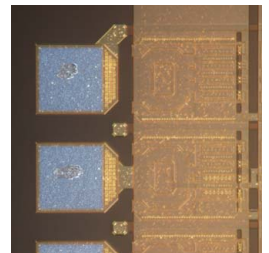
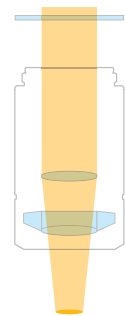
### DIC

Differential Interference Contrast observation — ideal for inspecting uneven surfaces or nanometer-level imperfections.



### PO

Polarized light observation — a valuable technique for eliminating glare on substrates. Allows surfaces characteristics to be accurately displayed.



## Choose the Observation Method with One Easy Click

With virtually every industrial observation method just a click away, the DSX510 makes it easy to choose the right one for the task at hand. No complicated adjustments needed — simply choose between modes (brightfield, darkfield, MIX [BF + DF], Differential Interference Contrast, polarized light) and start creating high-end images that meet precise demands.

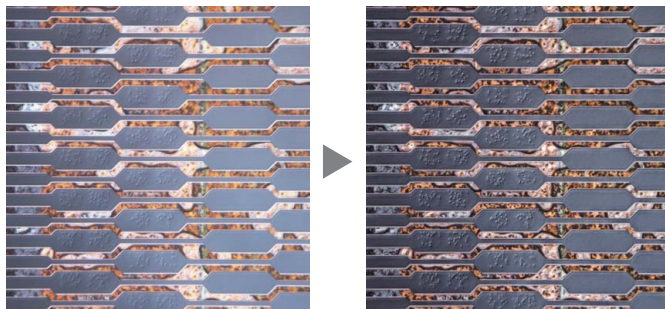


A click of a button delivers the required image on screen

# Advanced Image Processing

## HDR: High-Definition Visuals Beyond the Human Eye

Sample appearance can vary depending on quality of material, surface conditions, or illumination methods. One of a variety of observation methods made possible by the advanced digital technology of DSX510, the HDR (High Dynamic Range) function, combines several images taken at different exposures to accurately correct brightness differences on the sample surface, delivering a more consistently accurate sample rendition. HDR provides high-fidelity images that show not only textures but also flaws and defects that were previously undetectable. Glare can also be reduced for more comfortable observation.



Anisotropic conductive film (ACF) on the LCD pattern (Normal)

(HDR)

## Option

### Fast HDR Mode

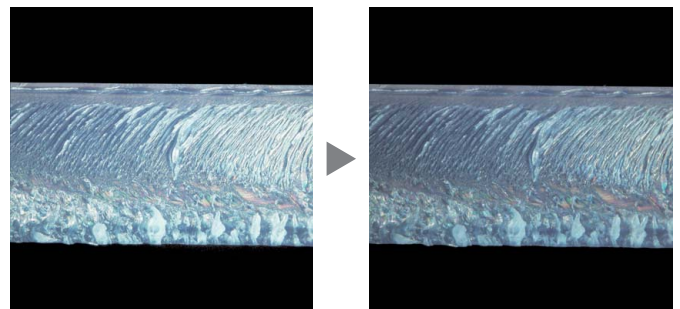
With a higher refresh rate than normal HDR, fast HDR provides smooth imaging even when moving the stage or focusing the sample.

### Fine HDR Mode

Fine HDR delivers better image quality with less noise. This is achieved by gathering more data than standard HDR.

## WiDER: Easy Inspection of Samples with High Reflectance Difference

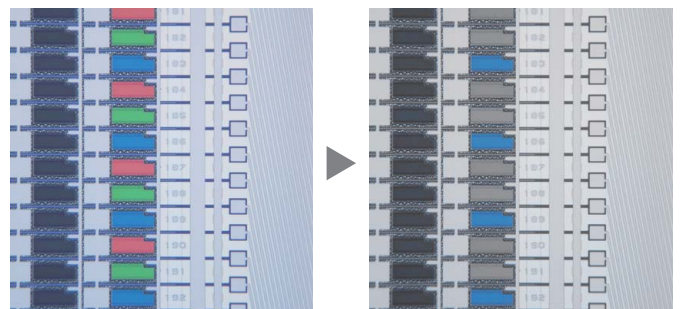
If a non-reflective image area cannot be seen, merely increasing illumination power is often not enough, as glare can occur. The DSX510 eliminates this issue with WiDER, a proprietary image processing system that takes care of high-contrast problems with one click. No blackouts. No glare.



A click removes problems caused by different contrast by materials

## Color Enhancement: See Only What's Required

The color enhancement feature of DSX510 allows color to be placed where it is needed while leaving the rest of the image in black-and-white, making it much easier to locate defects. Ideal for focusing on one particular defect.



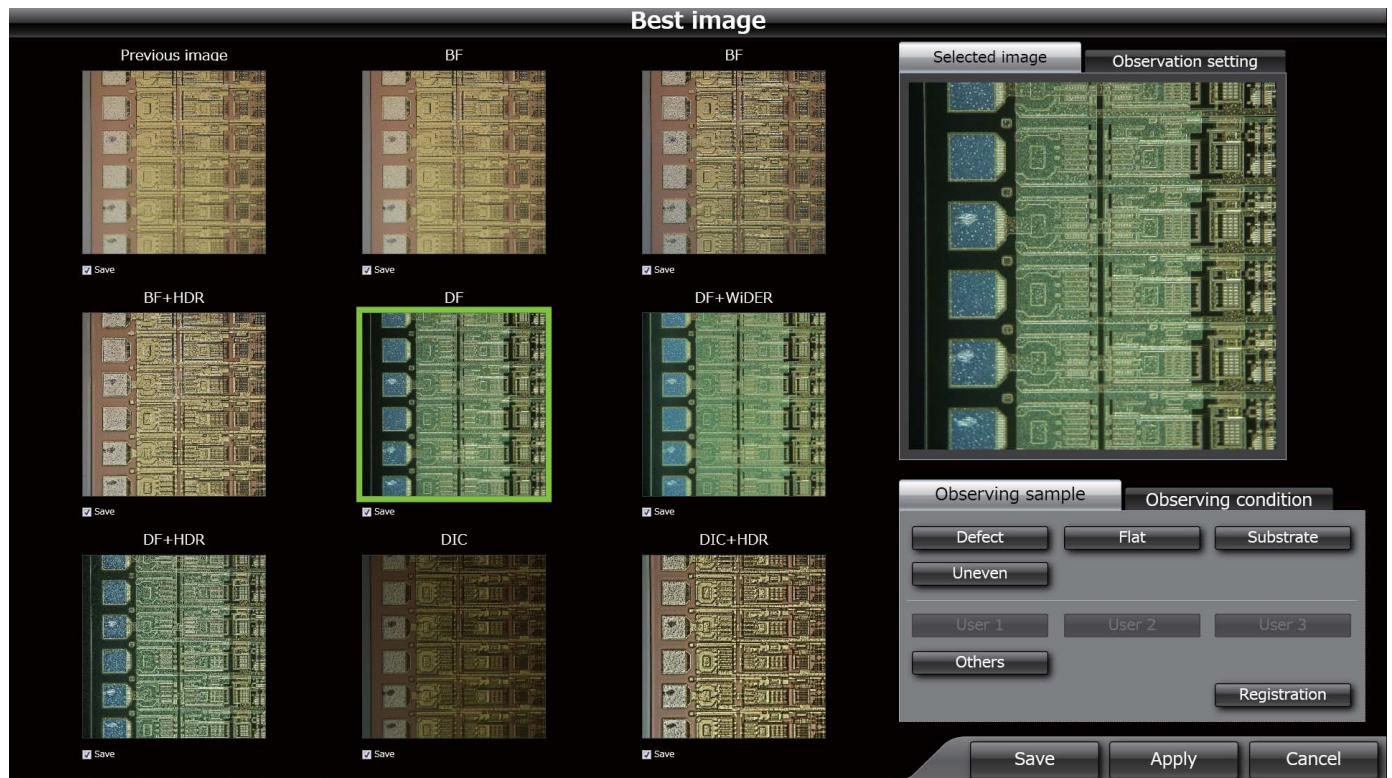
Inspection is easier when you can highlight possible defects or contamination for inspection



# Anyone Can Make Observations in Optimum Conditions

## Best Image Function Ensures Optimal Performance from Any Operator

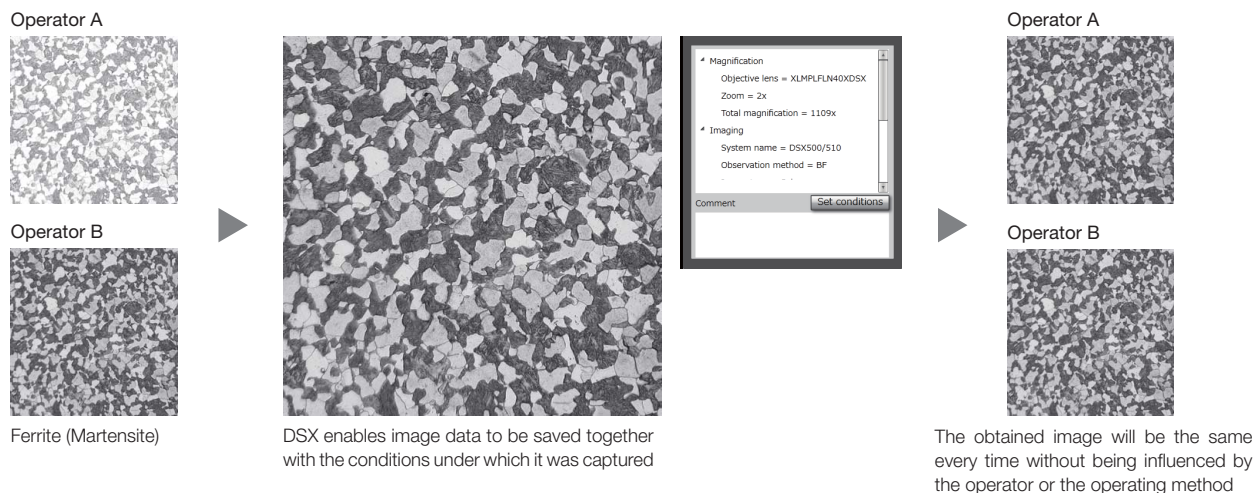
Operate the system by simply choosing the image that works best — the DSX510 will set all the necessary parameters to achieve that image. The Best image function ensures optimal images, whether looking for defects, uneven surfaces, or foreign objects. With Best image, anyone can operate the system — beginner to expert — and it can be customized for each operator.



Best image

## Repeatability: Easily Recall Any Inspection (Observation) Setting

The mechanisms of DSX510 fully digitalized so that every image taken or saved has the conditions it was taken under recorded with the image. If an image is captured with the DSX510, the operator can retrieve the conditions of capture from the image data with one click, enabling additional observations under the same conditions and settings.



# Offering Optimal Environments for Observation

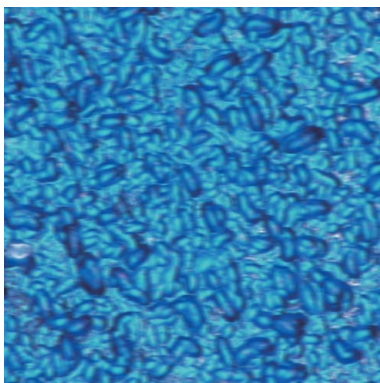
## Low Center of Gravity, Sturdy Frame

A low center of gravity, sturdy frame, and low underslung body provide the DSX510 with high stability at high magnification. An anti-vibration function significantly reduces any vibration that might affect inspection or measurement.

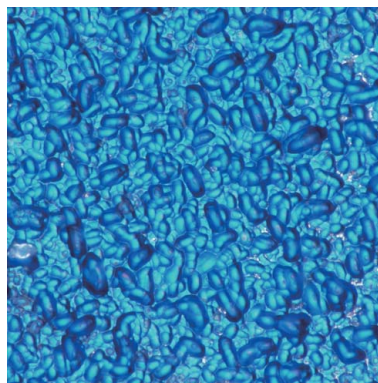


## Software Supports the Vibration Compensation Function

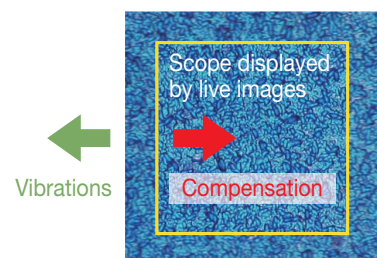
DSX has a sturdy, high-rigidity frame with a low center of gravity, which absorbs the impact of vibrations. Moreover, the software is also equipped with the anti-vibration function, making it possible to conduct stable observations even at high magnifications of over 9000X.



Without anti-vibration compensation



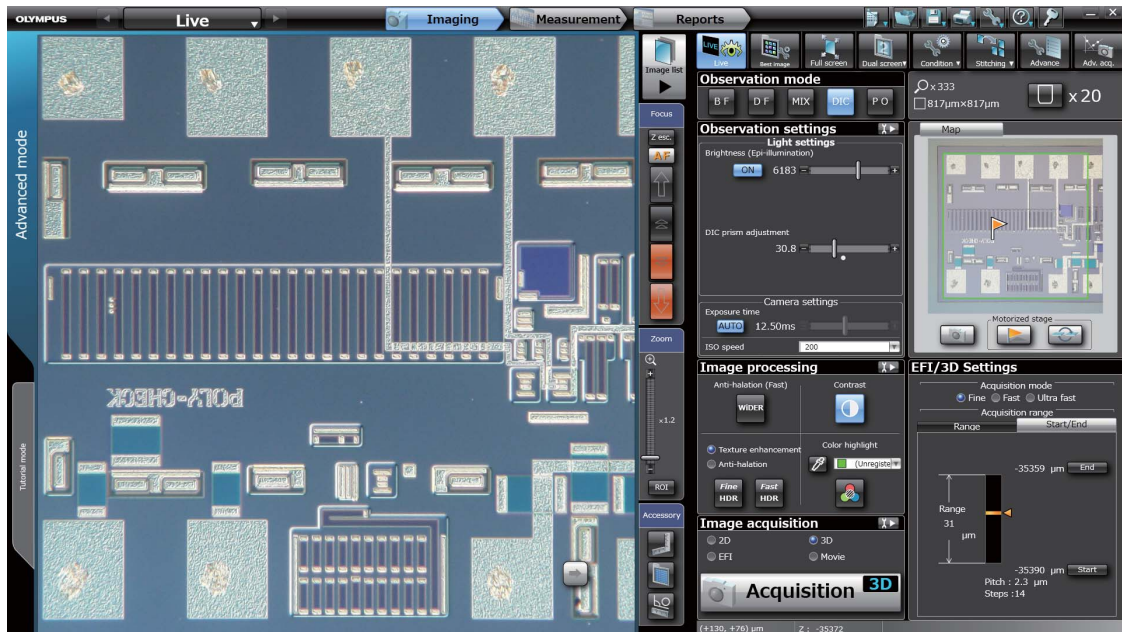
With anti-vibration compensation



# Operation Modes to Match the Observation Objective or Operator Experience

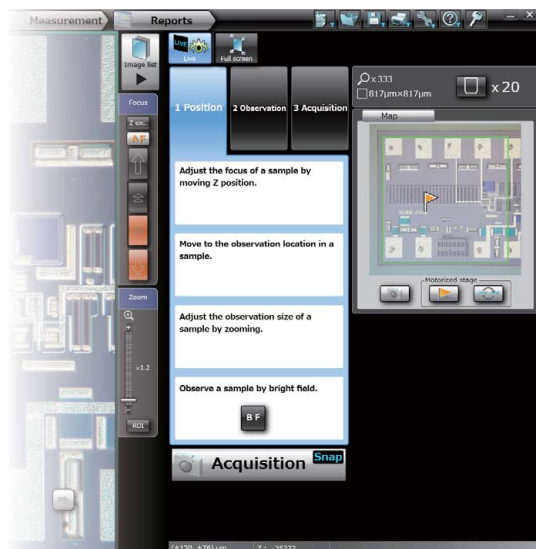
## Three User Modes Meet Operator Experience Levels and Job Demands

Select Tutorial, Operator or Advanced mode to best match the experience of the operator and the job at hand. Operator mode can be customized to speed up routine work. The operator's ID and password open the application, which automatically sets the scope to the operator's preferred mode and observation settings.



### Advanced mode

Makes jobs super-easy for the experienced operator. Laid out for action. Powered controls make operation much speedier.



### Tutorial mode

Eliminates the confusing aspects of operating a microscope. Just follow the suggestions the system gives for excellent output every time.



### Operator mode

This mode is customizable for speedy routine work. Most efficient when the same task is done repeatedly.

# Easy Image Capturing

Image Capturing Has Never Been More Intuitive.  
Or More Informative.

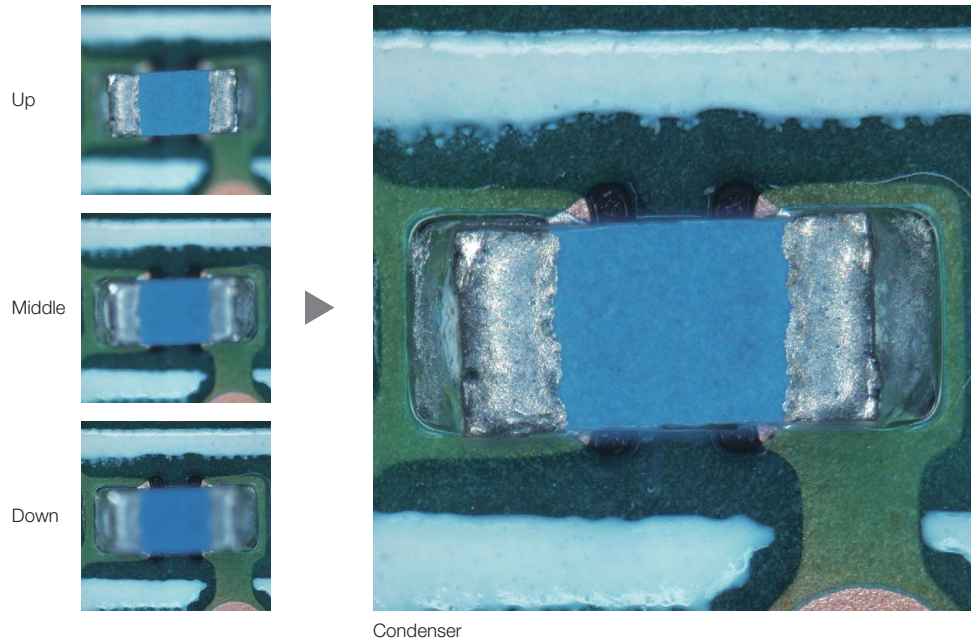


A variety of convenient image capturing methods. Extremely intuitive operation. Quick, easy access to the sample information observers need most. Ideal for users of all skill levels, the DSX510 does not require extensive microscope experience to capture and utilize images that fit precisely suit the requirements. In the past, only experts with years of experience could adjust microscopes in a way that allowed the capture of optimal images. Today, the DSX510 enables any operator to do so with an easy-use interface and advance image capture technology — in a few simple steps, the ideal image for inspection or analysis is attained. Reveal what couldn't be seen before. Realize what couldn't be created before. Achieve more than previously thought possible.

# Capture Full-Focus Images or 3D Images

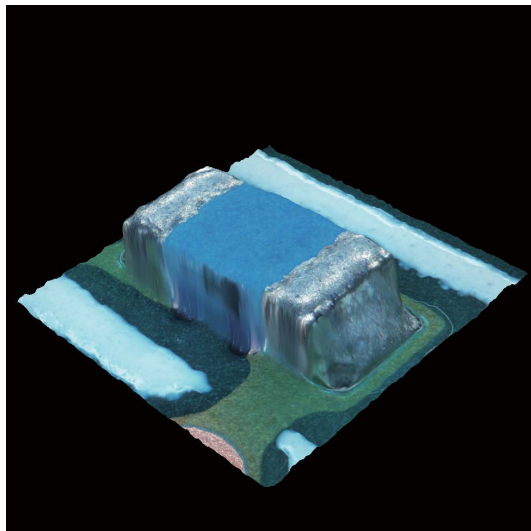
## EFI: View Uneven Samples in Focus Across the Entire Image

With its EFI (Extended Focal Image) capability, the DSX510 can obtain a clear, in-focus image of an entire sample with one click — no matter how uneven the surface. During EFI, several images are taken while the point of focus is moved up and down. From these images, the areas where the sample was in focus are combined into one image where the whole sample is in focus, allowing precise inspection of uneven surfaces. Olympus's EFI capturing speed is now faster than ever.

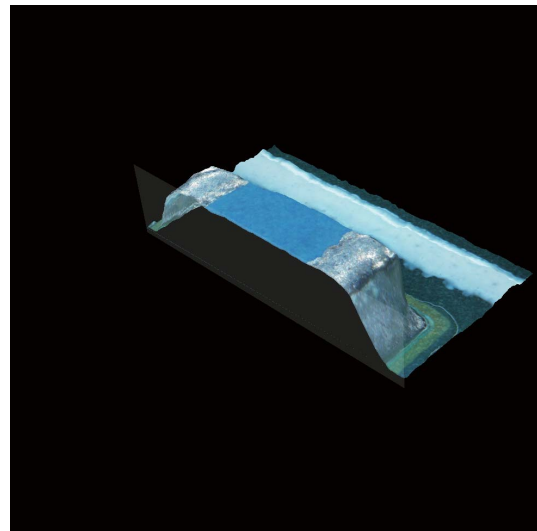


## 3D Image: One Click Shows the Sample in 3D

With one click, the DSX510 can capture image samples in three dimensions, allowing examination from any angle and a view of the sample as it actually is. With detailed 3D images, sample features or unevenness can be viewed and measured. Height differences and volume can also be measured, making it easier to accurately analyze the sample. 3D imaging is simple and fast, with improved capturing speed.



3D images



Cutaway view

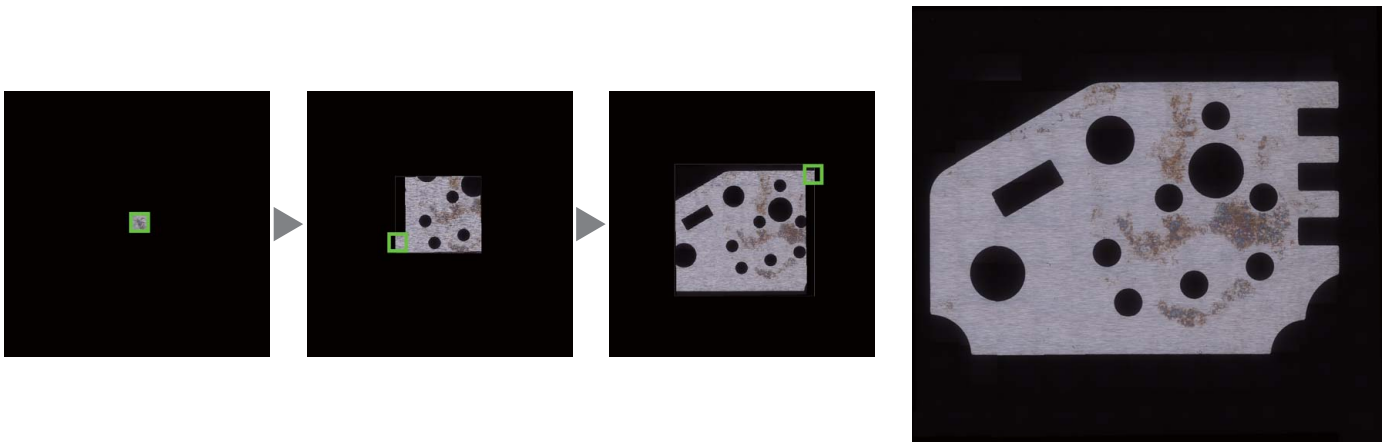
# Live Panorama Capturing Covers Large Areas Fast

## Live Panorama

There is no longer such a problem as “outside the field of view.” With Live panorama, simply move the observation position on the screen, and the motorized stage will move the sample to that position. As the stage moves, the system automatically stitches images into a large single field of view, in real time.

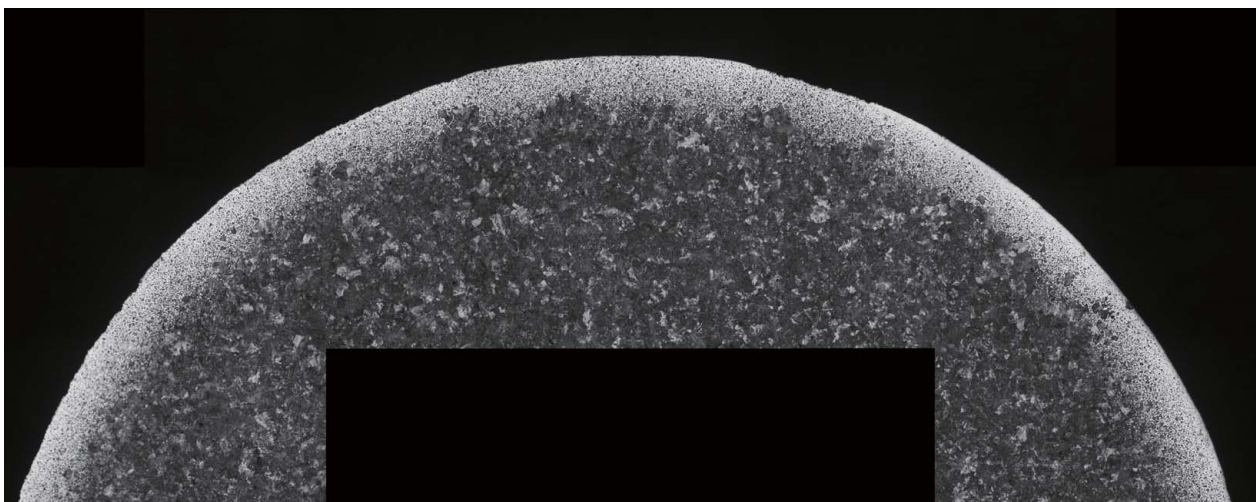
### Auto Panorama: One click captures a large field of view

Simply put the sample on the stage, and start the process with one click. The stage moves in a spiral and the feature captures the required area automatically. Detailed calibration is not necessary, so anyone can obtain a wide angle of view through easy operation.



### Manual Panorama: Prioritize a required area

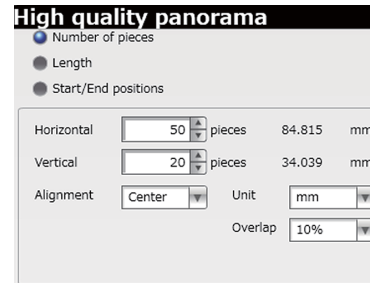
Obtains real-time image stitching of the desired area in a very short time, by moving the stage vertically, laterally and obliquely.



# Automatic Stitching Gives High-Quality, High Value-Added Image

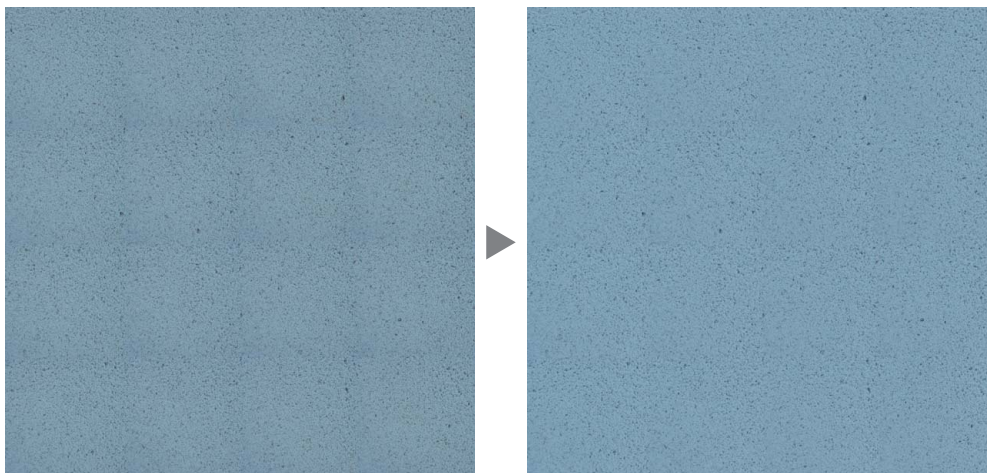
## High Quality Panorama

Set the number of images, the length, and the starting point, then start the image stitching process. This executes pattern matching and corrects shading, resulting in a high-quality and high value-added image.



## Improved Algorithms for Pattern Matching and Shading Correction

Wide angle, high-resolution and high-quality images are realized with optimized pattern matching and no misalignment.



## EFI and 3D Image Capturing

High quality panorama capability can be coordinated with EFI and 3D image capturing as well. The ability to capture images across a wide area, show uneven surfaces in full focus, and produce 3D images means the data exceeds that of ordinary digital microscopes.



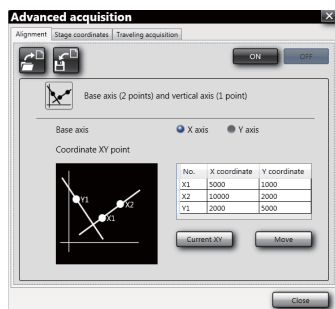
# Large Amounts of Data Automatically Captured

## Programmed Recipes: Automatically Capture Independent Points

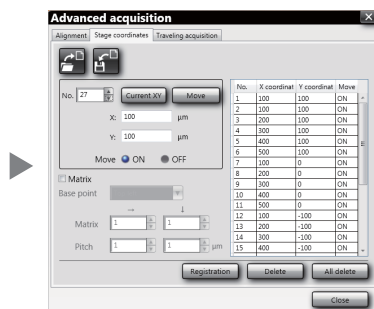
Through a convenient programmed recipe function, the DSX510 can automatically capture images of several registered points with autofocus.



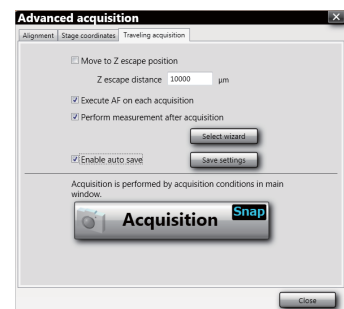
Motorized stage with 100 mm × 100 mm stroke



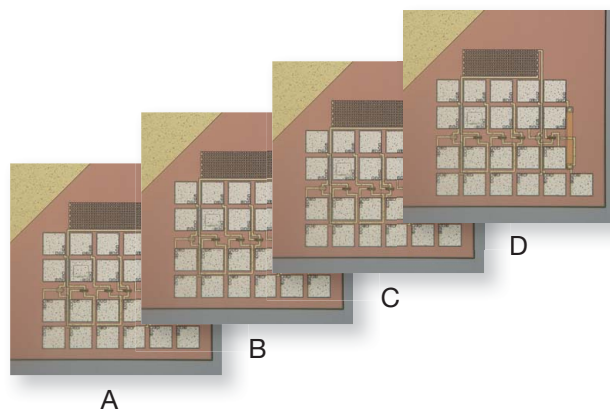
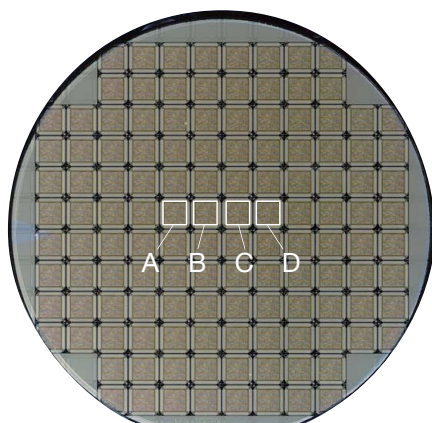
Alignment



Stage coordinates



Traveling acquisition

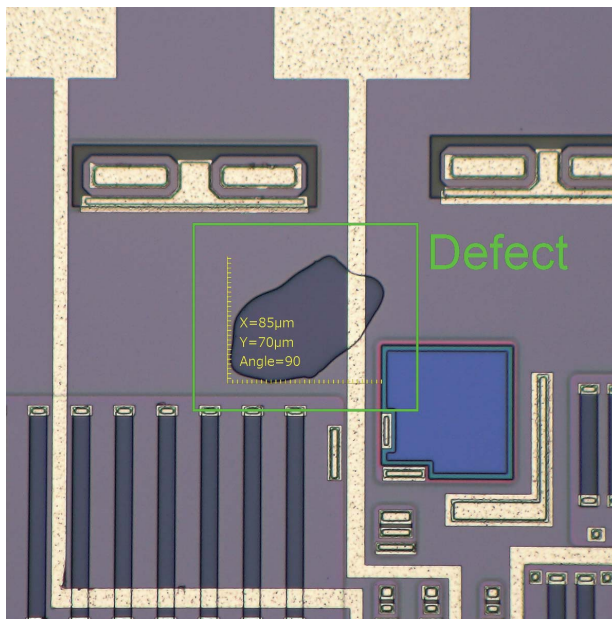




# Convenient Functions Support Image Capturing

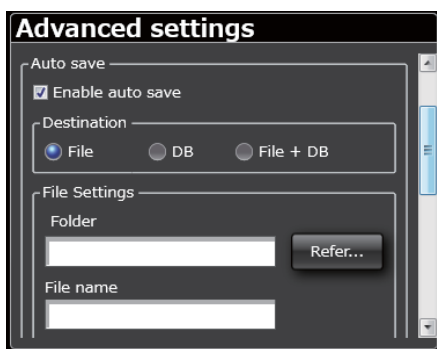
## Annotation

After capturing an image, annotations of important information and graphics can be saved with it. As position and explanation of defects can be saved and shown, this feature is excellent for sharing data with other people concerned.



## Automatic Save Function

Any image captured can be automatically saved to the folder indicated. In addition to file name and number, it is possible to expand the image as well.



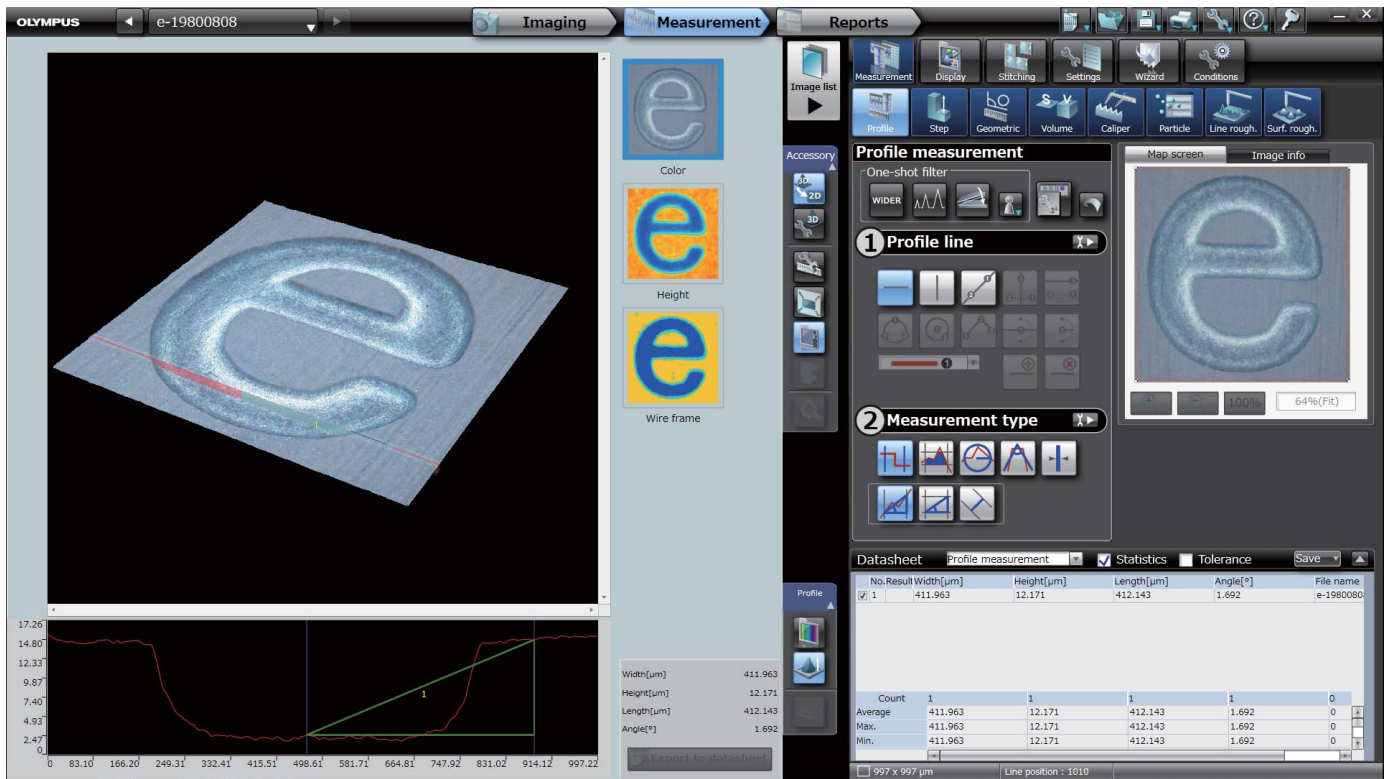
## Video Capturing

If a sample changes over time, the changes observed during live observation can be captured as video images. (file type: .avi)



# Accurate Measurement

Precision Measurement. Absolute Reliability.  
Unmatched Performance.



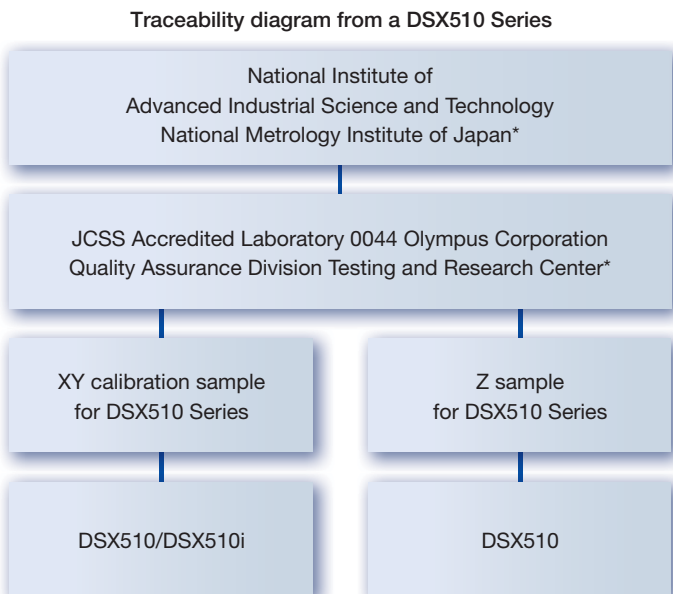
Olympus's unwavering commitment to accurate measurement is evident in every aspect of the DSX510, from telecentric optics to a stabilized frame design to auto-calibration that eliminates user error. Delivering reproducible measurement, traceable accuracy, and guaranteed Z measurement repeatability, the DSX510 cannot be matched by any conventional digital microscope.

# Advanced Technology Supports Precise Measurement

## Accuracy and Repeatability Guaranteed

The DSX510 delivers precise and repeatable measurements, with accuracy traceable to national standard.

•To guarantee XY accuracy, calibration work must be undertaken by Olympus's dedicated service staff



•To issue certificates, calibration work must be undertaken by Olympus's dedicated service staff

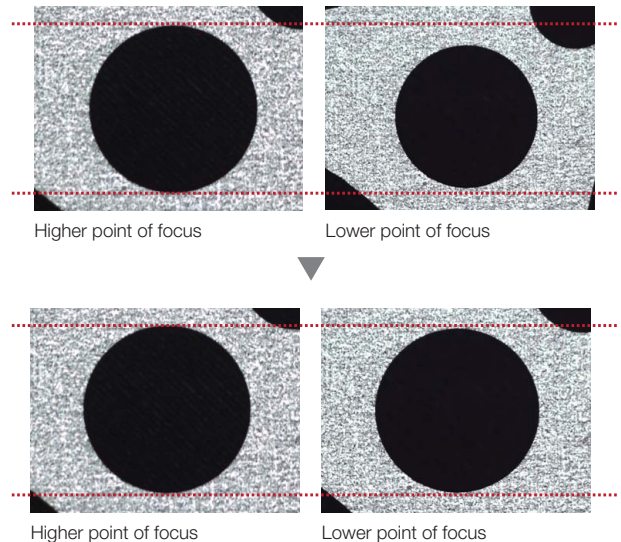
\*Differs according to national and regional statutes

## Guaranteed Z Measurement Repeatability

With the DSX510, repeatability of Z measurement is guaranteed (DSX510 only).

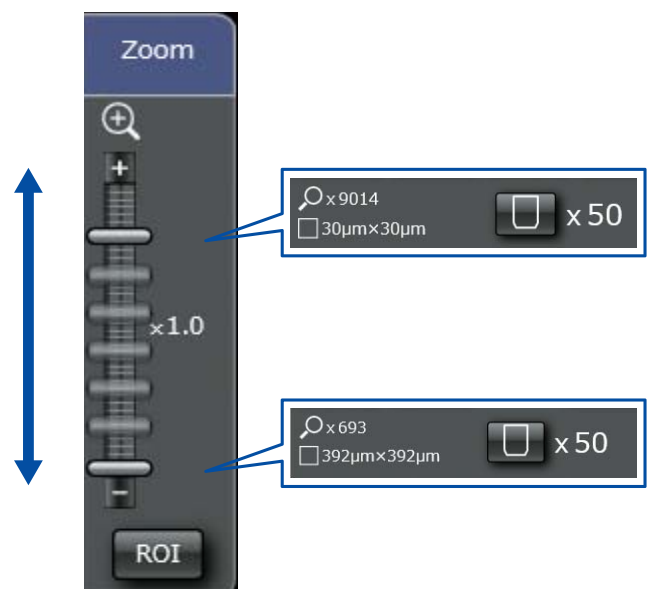
## The DSX510 Features Telecentric Optics

With telecentric optics, the image size is not altered with changes in focus. And because the image size does not change, precise measurement can be taken without concern for dispersion.



## Automatic Magnification Recognition

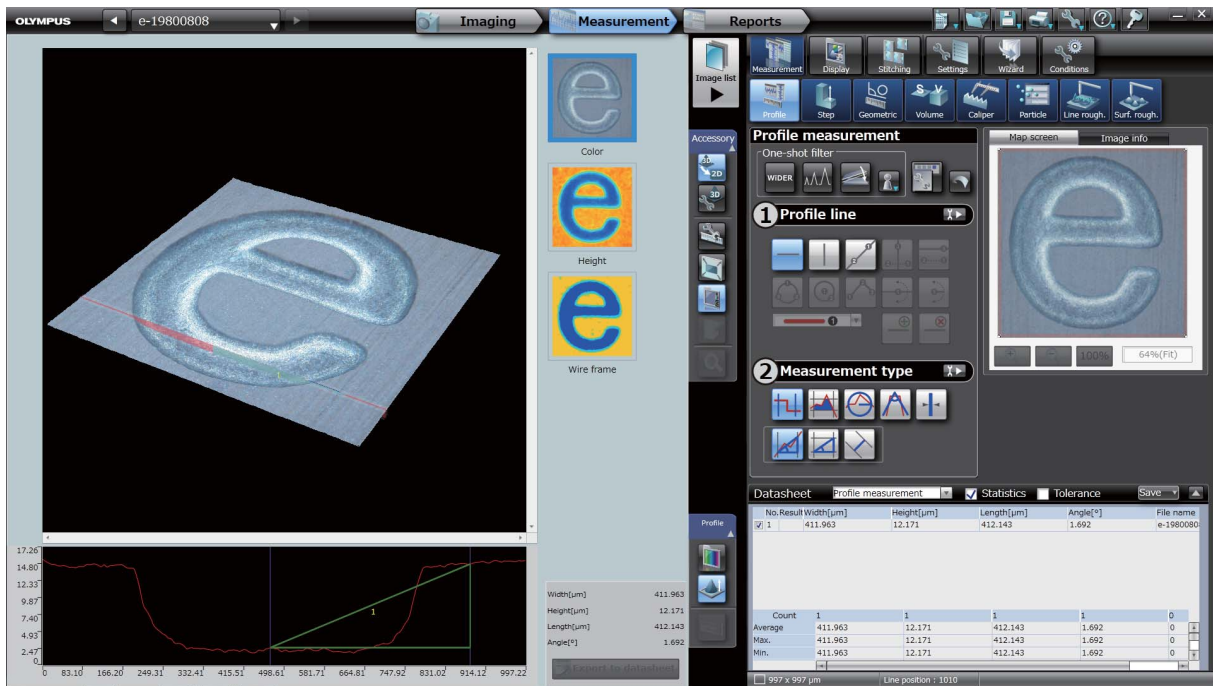
To reduce human error, DSX offers automatic magnification recognition, with a motorized zoom system so the system always knows which lens is being used. Changing lens magnification automatically changes the magnification setting, eliminating the opportunity for measurement error. When the zoom magnification is changed, the current magnification and image area information is also updated, further reducing errors in magnification indication and in measurement.



# Ample Measurement Functions

## The Features Required to Ensure Optimal Measurement Results

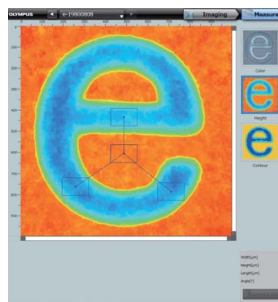
All fundamental industrial microscope measurement capabilities are standard features of DSX510 software, making it easy to obtain optimal measurement results. Optional software is available for 3D measurement, caliper measurement, and particle analysis.



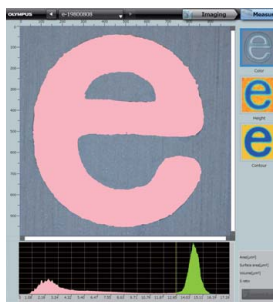
Profile 3D measurement



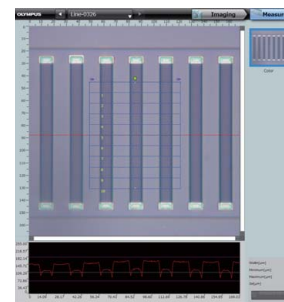
Live measurement



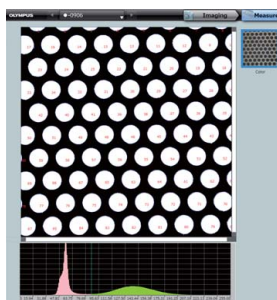
Step



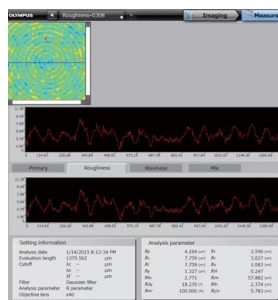
Area/Volume



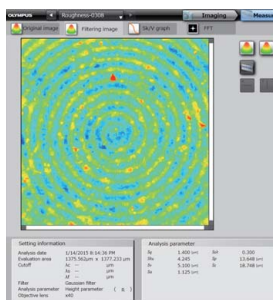
Caliper



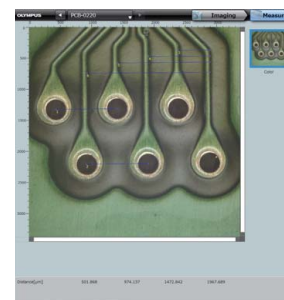
Particle



Line roughness



Surface roughness



Geometric

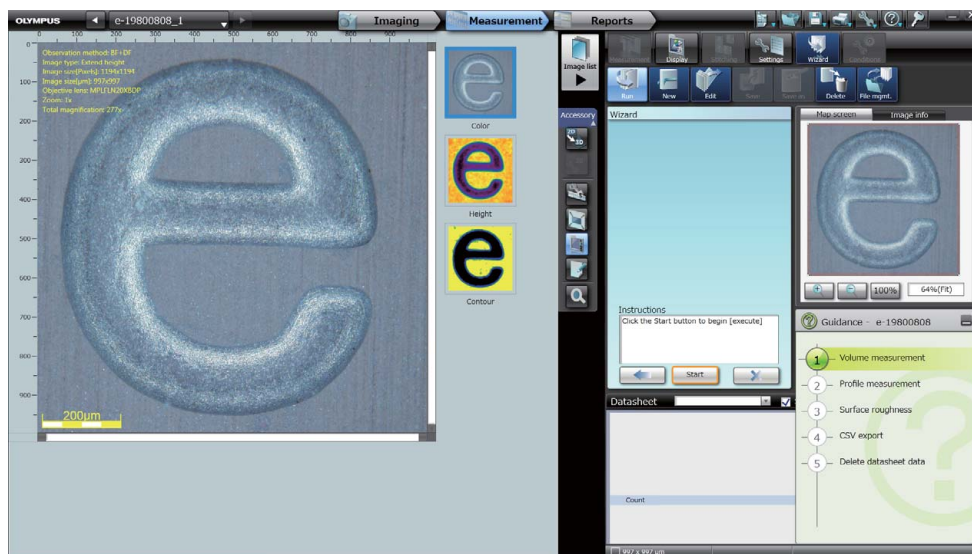
# A Higher Level of Measurement and Analysis

## The Power to Self-Check Reproducibility

Using Gage R&R as defined by the MSA enables management of inspection variances originating in the process. Users can access variances in the inspection when measuring actual samples.

## Automate Measurement with a Simple Wizard Function

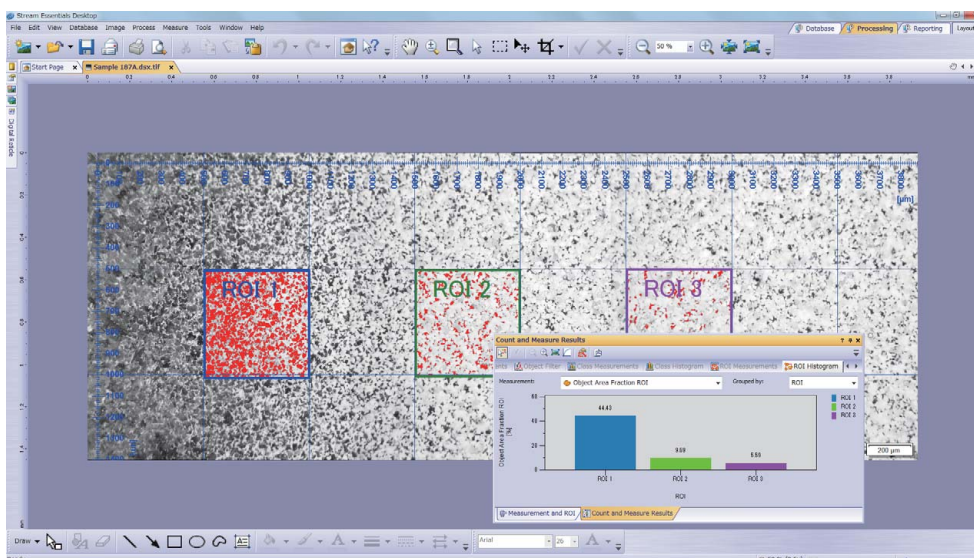
Using the simple wizard function of DSX510, many measurement processes can be easily automated. Once an image is created, the measurement wizard can run automatically or the wizard can also be connected to an automatic image capturing wizard, further automating the imaging and measurement process.



Measurement wizard

## Advanced Material Analysis with OLYMPUS Stream

Granularity analysis, cast iron analysis, non-ferrous metal inclusions analysis, chart comparisons, advanced particle analysis — virtually every metallography evaluation can be done with optional OLYMPUS Stream image analysis software. With one click, Stream can access all DSX510 file data, including basic calibration data, and deliver a diverse, flexible workflow that moves from measurement to analysis to report production. Dedicated analysis is performed in accordance with industrial standards.



# Easy Sharing

Custom Reports. Easy to Create.



With the DSX510, in one simple click the report function is in motion, recording images and measurements and turning them into detailed custom reports. Perform the observation or measurement – the system automatically generates the reports required. The DSX510 also allows easy sharing of these reports, with the option to export to a variety of convenient formats (rtf, PDF, Excel).

# 100% of All Data Can Be Shared

## Build Reports from the Office

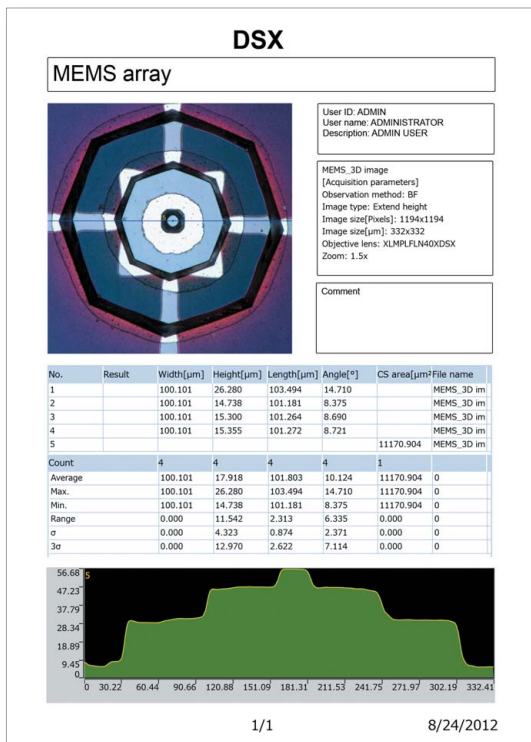
The DSX510 also offers free offline software which allows performing of measurements and building reports at the office.

## Custom Report Generation Made Easy

With the DSX510, It's easy. Operators concentrate on image capture, observation, and measurement, and the DSX510 automatically generates the relevant reports. Report templates are fully customizable.



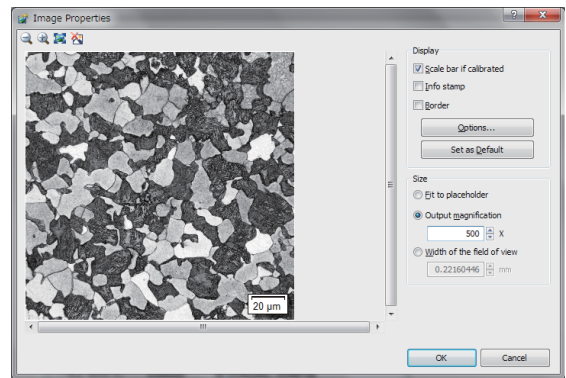
A click can generate a report



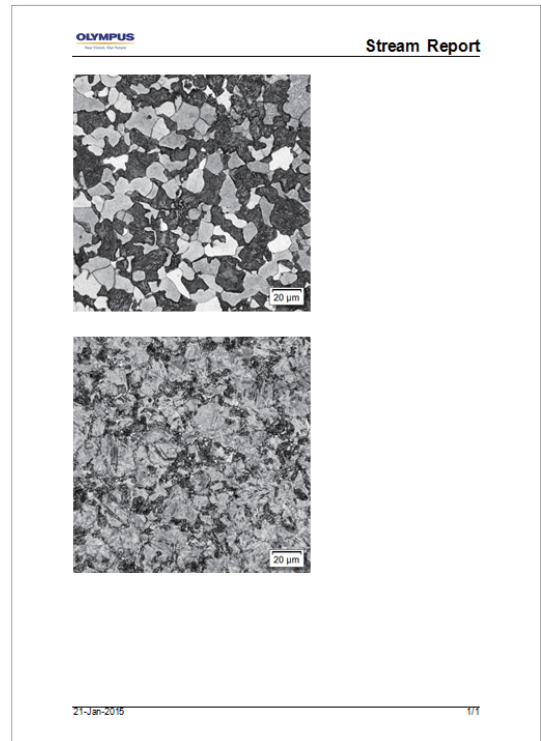
Report output

## Designates Printing Magnification from OLYMPUS Stream

Measurement results can be easily transferred to optional OLYMPUS Stream image analysis software, which offers advanced editable reporting. Stream reports can then be printed by specifying a scaling factor.



Magnification setting



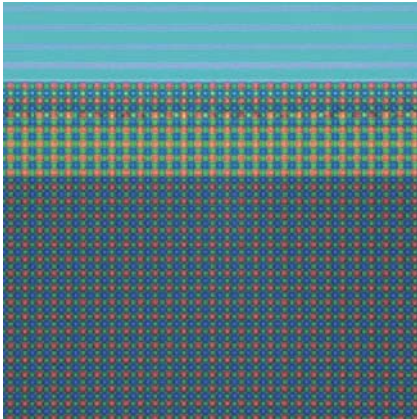
Printing

# Applications

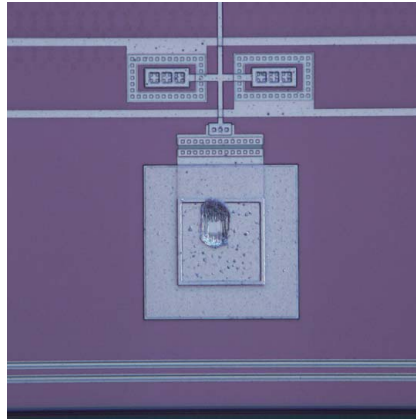


## DSX510

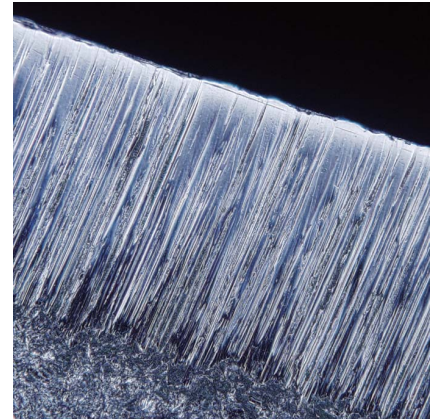
Upright High-resolution  
Digital Microscope



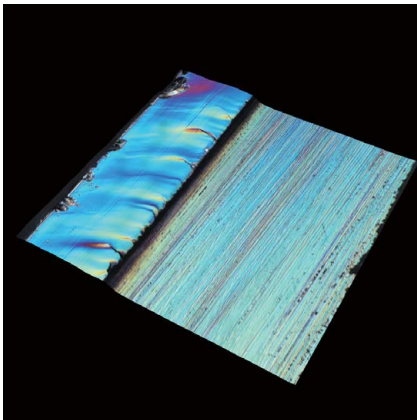
CCD



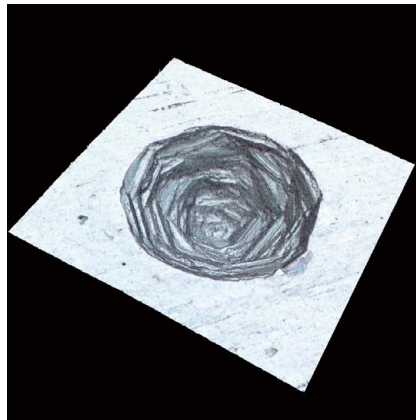
Electrode pad



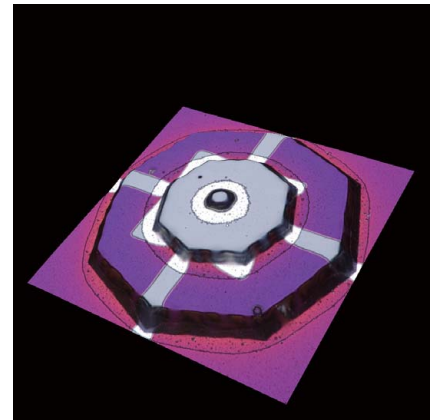
Blade



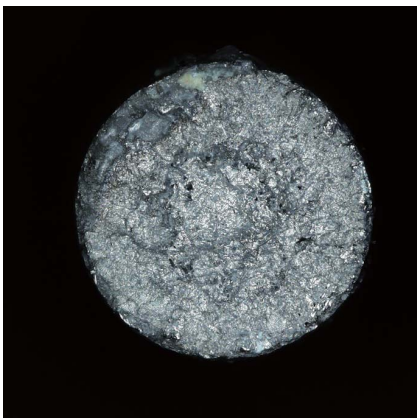
Diced surface of IC chip



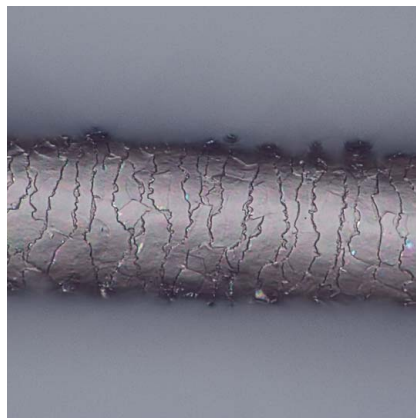
Punch mark



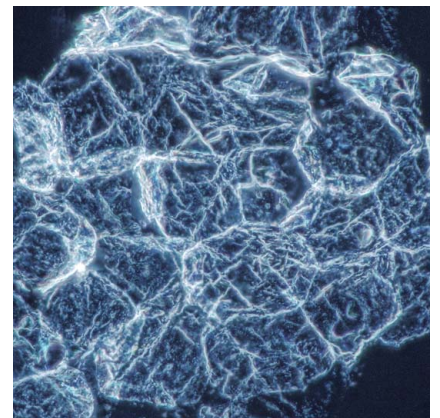
MEMS



Fractured metal surface



Hair



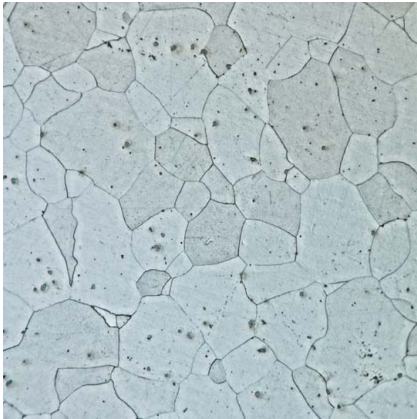
Horny cell layer



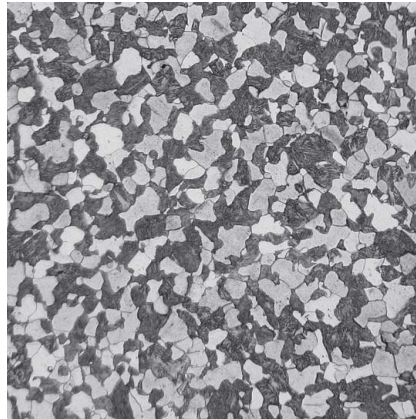


# DSX510i

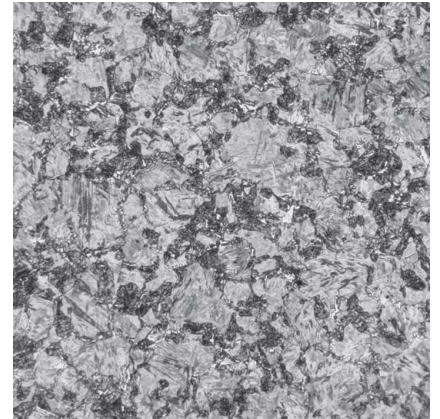
Inverted High-resolution Digital Microscope



Ferrite



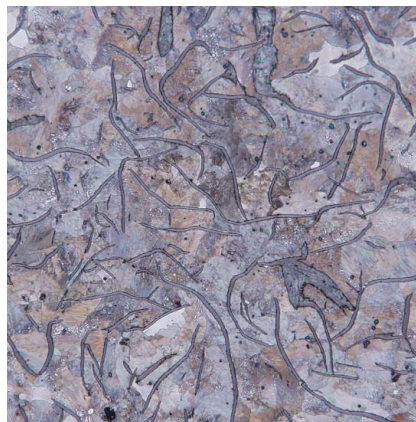
Ferrite (Martensite)



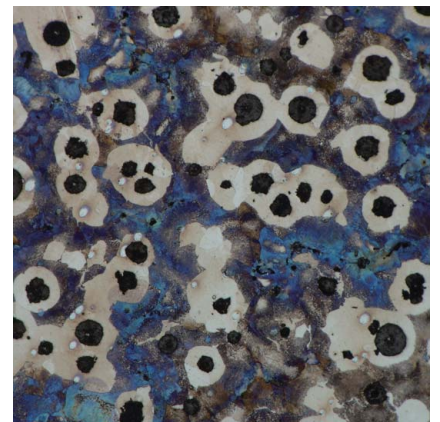
Martensite



Carburized structure



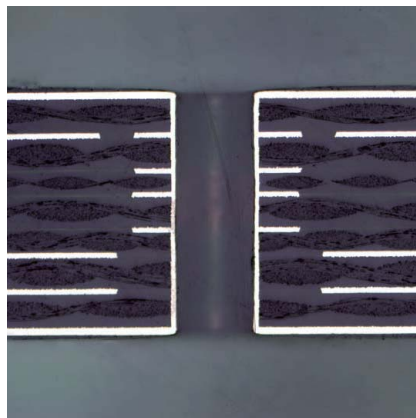
Cast iron



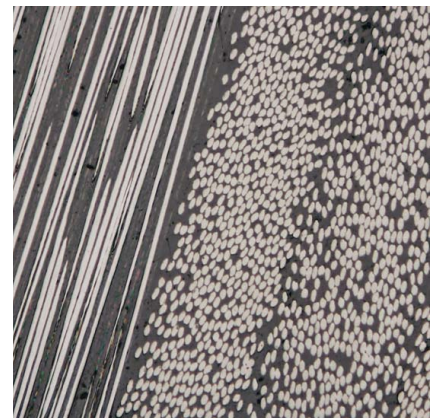
Nodular graphite cast iron



Cross section of bump

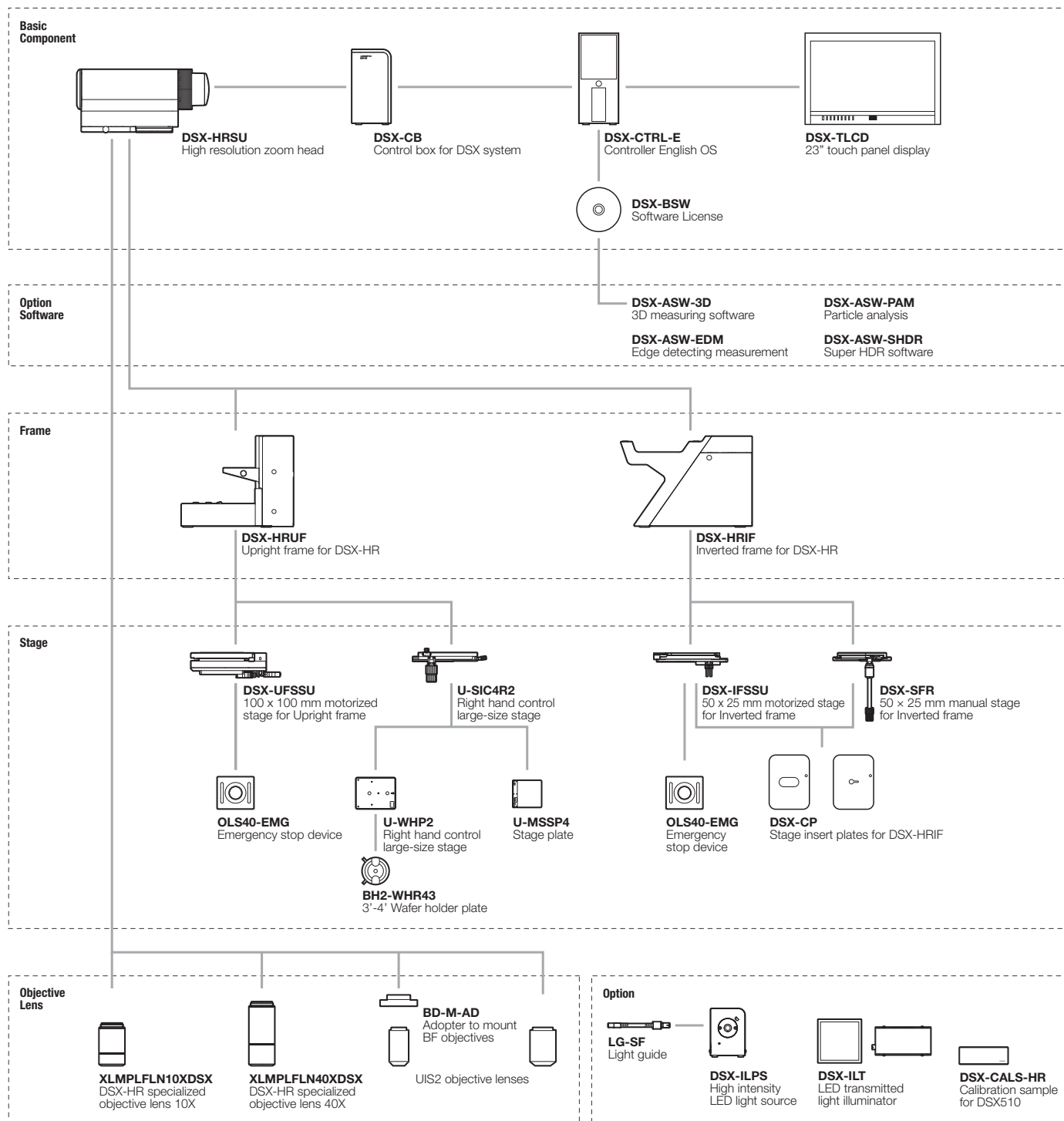


Multilayer board

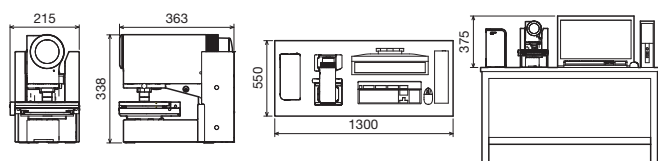


Glass fiber

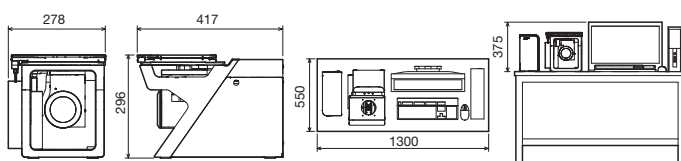
# DSX510/DSX510i System diagram



DSX510 Dimensions



DSX510i Dimensions



unit: mm

# DSX510/510i Specifications

		DSX510	DSX510i	
Zoom ratio		13.5X optical zoom (0.26X to 3.5X), 30X with digital zoom		
Number of attaching objective lenses		up to 2 pieces		
Mountable objective lens	DSX dedicated objective lens	XLMPLFLN10X, XLMPLFLN40X		
	UIS2 objective lens	MPLFLN1.25X, MPLFLN2.5X, MPLFLN5XBDP, MPLFLN10XBDP, MPLFLN20XBDP, MPLFLN50XBDP, LMPLFLN10XBD, LMPLFLN20X, LMPLFLN50X, MPLAPON50X		
Accuracy and repeatability (X-Y plane)	Accuracy of magnification	±3%*2		
	Repeatability of magnification	3σ <sub>n-1</sub> = ±2%		
Repeatability (Z axis)	Repeatability of height	$\sigma_{n-1} \leq 1 \mu\text{m}$	-	
Illumination	Embedded standard	Bright field: LED, Dark field: LED		
	Optional illumination	High intensity LED*1/Transmitted LED	High intensity LED*1	
Main frame	Image sensor	1/1.8 inch, 2.01 megapixels, color CCD (total pixels: 2.10 megapixels) Total pixels : 1688 (H) x 1248 (V) Available pixels: 1628 (H) x 1236 (V) Effective pixels : 1600 (H) x 1200 (V)		
	Cooling method	Peltier cooling		
	Scan mode	Progressive scan		
	Frame rate	15 fps/27 fps with binning mode		
	Image size	Normal : 1194 x 1194 (1:1)/1592 x 1194 (4:3) Fine : 1194 x 1194 (1:1)/1592 x 1194 (4:3) Super fine : 3594 x 3594 (1:1)/4792 x 3594 (4:3)		
	Sensitivity	ISO 100/200/400/800/1600 equivalent		
	Focusing unit	Stroke	95 mm	35 mm
Resolution		0.01 μm		
Maximum sample height	DSX dedicated objective lens	65 mm	-	
	UIS2 objective lens	95 mm	-	
Stage	Motorized stage	Model	DSX-UFSSU	DSX-IFSSU
		Stroke	100 x 100 mm	50 x 25 mm*3
		Load capacity	3 kg	1 kg
	Manual stage	Model	U-SIC4R2	DSX-SFR
		Stroke	100 x 105 mm	50 x 25 mm*3
		Load capacity	1 kg	1 kg
LCD monitor	Size	23" with touch panel and Full HD color LCD monitor		
	Resolution	1920 (H) x 1080 (V)		
Weight (Main frame, Motorized stage, LCD monitor, Control box, Controller)		Approx. 38.6 kg	Approx. 44.1 kg	
Input rating		100-120 V/220-240 V, 300 V A, 50/60 Hz		

\*1 Cannot be used with the embedded standard LED. \*2 Calibration by Olympus or dealer specialists necessary. \*3 When the objective lens MPLFLN50XBDP or MPLAPON50X is attached, the stroke is 25 x 25 mm.

## DSX510/510i Series objective lens

Series	Model	Parfocal distance	NA	W.D. (mm)	Actual F.O.V. (μm)*3	Total magnification*4
DSX dedicated objective lens	XLMPLFLN10XDSX*1	75 mm	0.3	30.0	2,772-214	139X-1,803X
	XLMPLFLN40XDSX*1		0.8	4.5	693-54	555X-7,211X
UIS2 objective lens	MPLFLN1.25X*2	45 mm	0.04	3.5	22,181-1,706	17X-225X
	MPLFLN2.5X*2		0.08	10.7	11,090-853	35X-451X
	MPLFLN5XBDP		0.15	12.0	3,921-302	69X-901X
	MPLFLN10XBDP		0.25	6.5	2,772-214	139X-1,803X
	MPLFLN20XBDP		0.4	3.0	1,386-106	277X-3,606X
	MPLFLN50XBDP		0.75	1.0	554-42	693X-9,014X
	LMPLFLN10XBD		0.25	10.0	2,772-214	139X-1,803X
	LMPLFLN20XBD		0.4	12.0	1,386-106	277X-3,606X
	LMPLFLN50XBD		0.5	10.6	554-42	693X-9,014X
	MPLAPON50X*1		0.95	0.35	554-42	693X-9,014X

\*1 DF and MIX are not available \*2 Available for BF only \*3 At aspect ratio 1:1 diagonal (with factory default value) \*4 At aspect ratio 1:1

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