

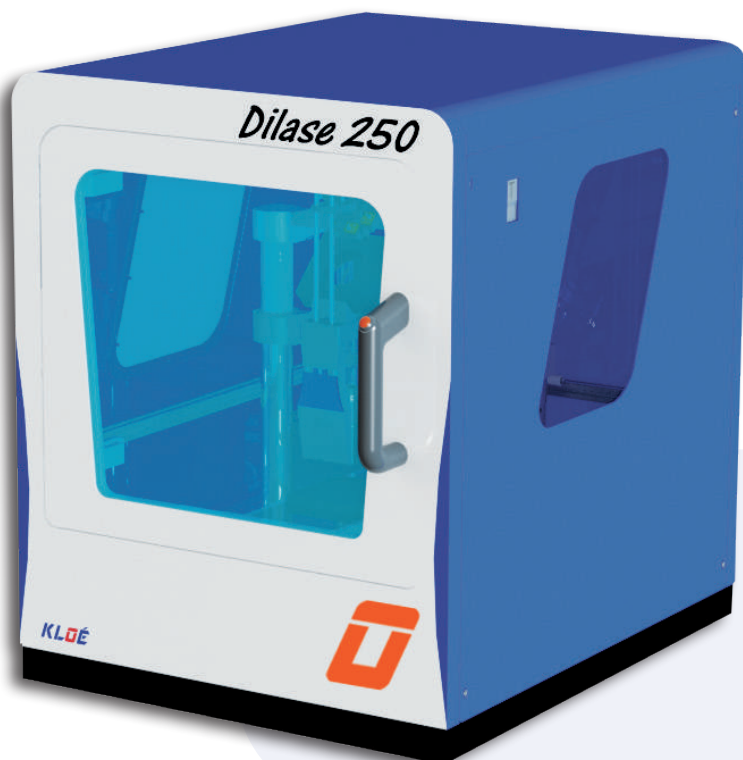


Keys to your expectation in Optics

Dilase 250

Table-top direct laser lithography system

- ▶ Very compact table top system
- ▶ Mask fabrication and direct writing
- ▶ Laser source at 375nm or 405nm
- ▶ Compatible with all photoresists
- ▶ High aspect ratio : 1x20



Dilase 250

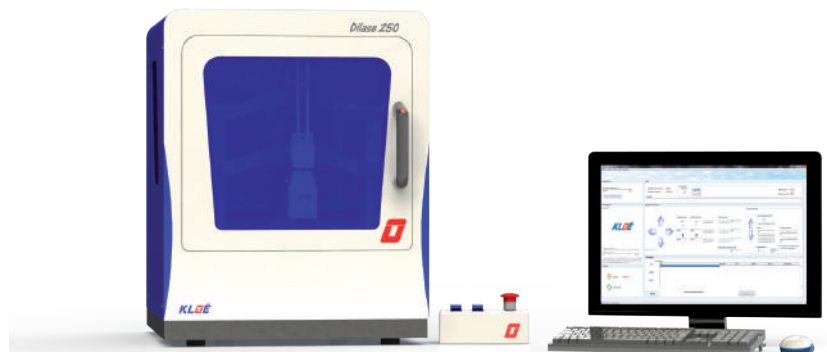
The Dilase 250 is a practical, table-top high resolution laser lithography system. Lithographic microstructures can thus be written with Dilase 250 in photoresists, sensitive to either blue or ultraviolet lasers wavelengths, by means of a fixed continuous laser source emitting at 375 or 405 nm. The writing surface can extend up to 4 inches, while the minimum achievable feature size (width) is 1 μm .

This equipment offers both vectorial and scanning writing modes and ensures a trajectory within a 100 nm maximum deviation range. The included motorized optical focusing system offers fast and fine focalisation setting to match various substrates thicknesses requirements, from 150 μm to 5 mm. This compact system also provides optional wafer loading and unloading system to the substrate chamber, enabling improved cleanliness, higher throughput and user safety. The Dilase 250 system is compatible with most of the commercially available photoresists, such as SU8, Shipley and AZ resists.

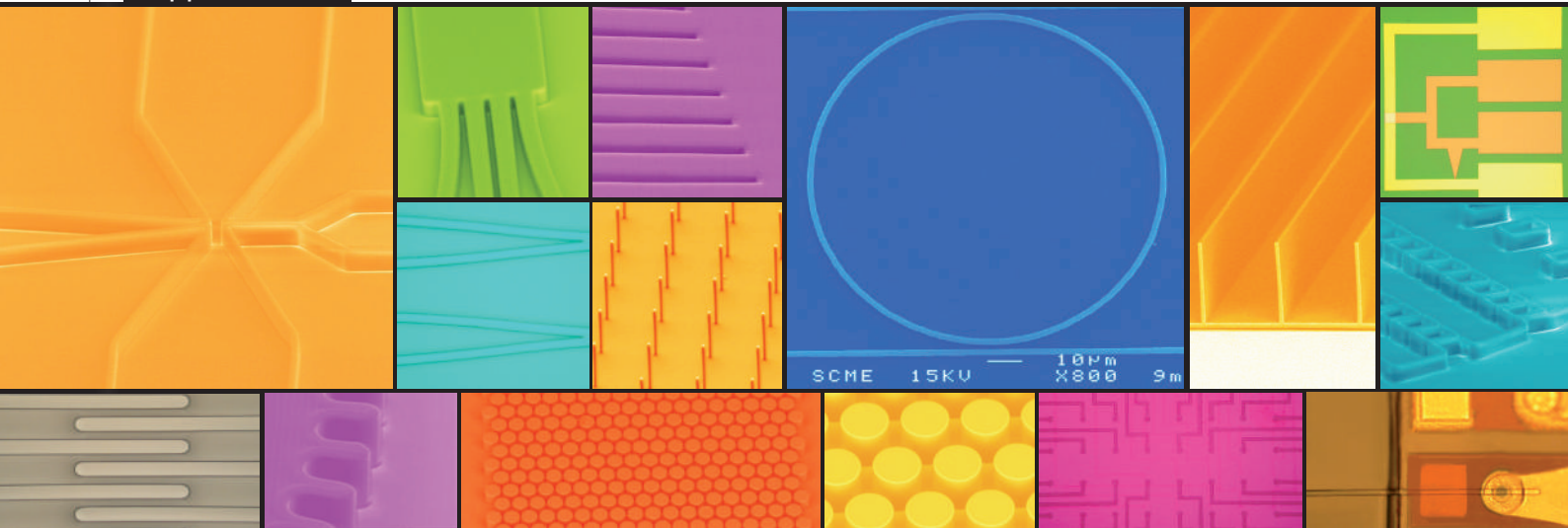
It is merely optimized for use with the K-CL resists developed by KLOE for high aspect ratio microstructuration applications (1x20), by laser lithography.

Features

- Compact footprint : 550 x 670 x 700 mm.
- PC control interface.
- Available laser sources : 375 or 405 nm.
- Optical subassembly shapes and homogenizes the laser beam.
- 1 optical spot size available.
- High resolution video positioning system.
- Data formats supported : LWI (Kloé Design format), DXF and GDS2.
- Automated focusing setting.
- Integrated design software : Kloé Design V.2.
- 2 modes of write : vectorial and raster scan.



Applications



Performances

Linear writing speed	> 100 mm.s^{-1}
Stage travel resolution	100 nm
Repeatability	100 nm
Wafer writing area	1 to 4 inches
Substrate thickness	150 μm to 5 mm
Laser spot size	1 μm to 50 μm
Form factor	Minimum 10
Standard multilevel alignment precision	1 μm

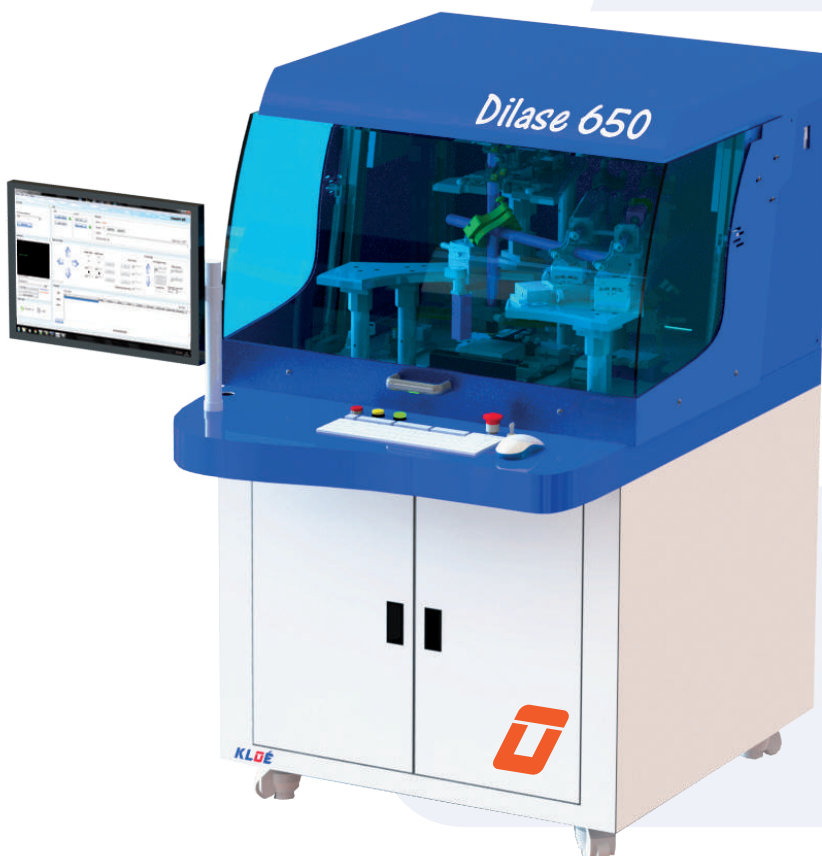


Keys to your expectation in Optics

Dilase 650

All-in-one maskless direct laser lithography system

- ▶ An advanced system for mask fabrication and fast prototyping
- ▶ High speed lithography
- ▶ 266nm, 375nm and 405nm
- ▶ Compatible with all photoresists
- ▶ Very high aspect ratio : 1x50
- ▶ High resolution lithography



Dilase 650

Dilase 650 is the all-in-one direct laser writing equipment. This system, dedicated to photolithography, is a high-performance laser processing tool, offering access to the flexibility of a maskless technology, mainly suitable to speed up development and optimisation times required when dealing with new products range or prototyping.

Powered by very fast and accurate stages, Dilase 650 allows writing patterns in photosensitive resists deposited on planar substrates up to 6 inches diameter and mask blank up to 7 inches, by means of one or two continuous laser sources (375 or 405 nm).

Up to 2 different optical lines can be implemented on Dilase 650, giving the opportunity to use up to 2 different spot sizes and hence, to combine a high resolution head to create micron-scaled patterns and a wider sized spot to optimise writing times required to fill large surfaces.

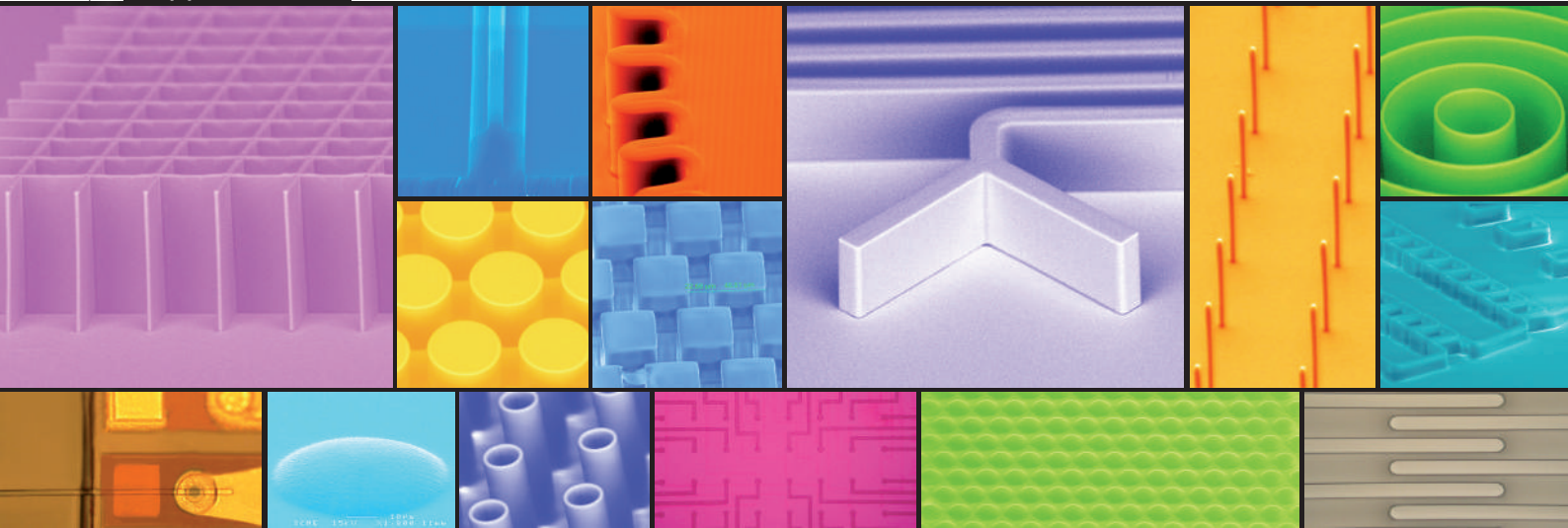
Dilase 650 is fully compatible with most of the commercially available photoresists, such as SU8, Shipley and AZ resists. It is merely optimized for processing K-CL resins, developed by Kloé, to quickly achieve fine resolution and high aspect ratio microstructurations (1x50 and more) or microfluidic devices fabrication.

Features

- Size : 1270 x 970 x 1650 mm
- Integrated computer control interfaces (Windows OS)
- 1 to 2 laser sources : 266, 375 and / or 405 nm
- 1 to 2 optical sub-assemblies
- High resolution video positioning system
- Data formats supported : LWI (Kloé Design format), DXF, GDS2
- Automated focus setting
- Integrated design software : Kloé Design V.2
- 2 modes of write : vectorial and raster scan



Applications



Performances

Linear writing speed	> 500 mm.s ⁻¹
Stage travel resolution	100 nm
Repeatability	100 nm
Wafer writing area	1 to 6 inches
Substrate thickness	250 µm to 10 mm
Laser spot size (1 or 2)	1 µm to 50 µm
Form factor	Minimum 10
Realignment precision	500 nm



Keys to your expectation in Optics

Dilase 750

Fully modular high-end direct laser lithography system

- ▶ An advanced system for very high resolution
- ▶ Flexible and fully customizable
- ▶ 266nm, 325nm, 375nm, 405nm or 445nm
- ▶ Compatible with all photoresists
- ▶ Very high aspect ratio : 1x50
- ▶ Fast patterning and mask fabrication
- ▶ Large writing exposure area

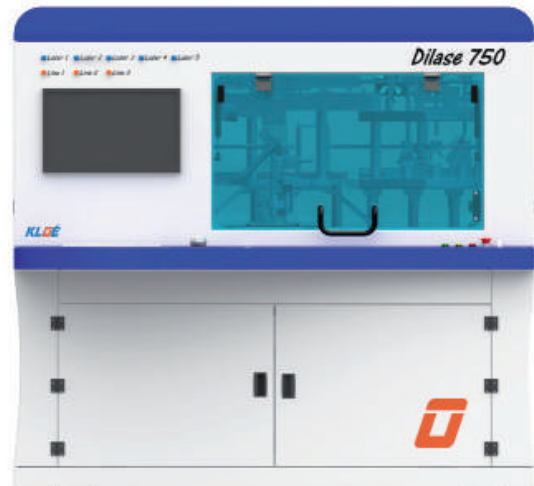


Dilase 750

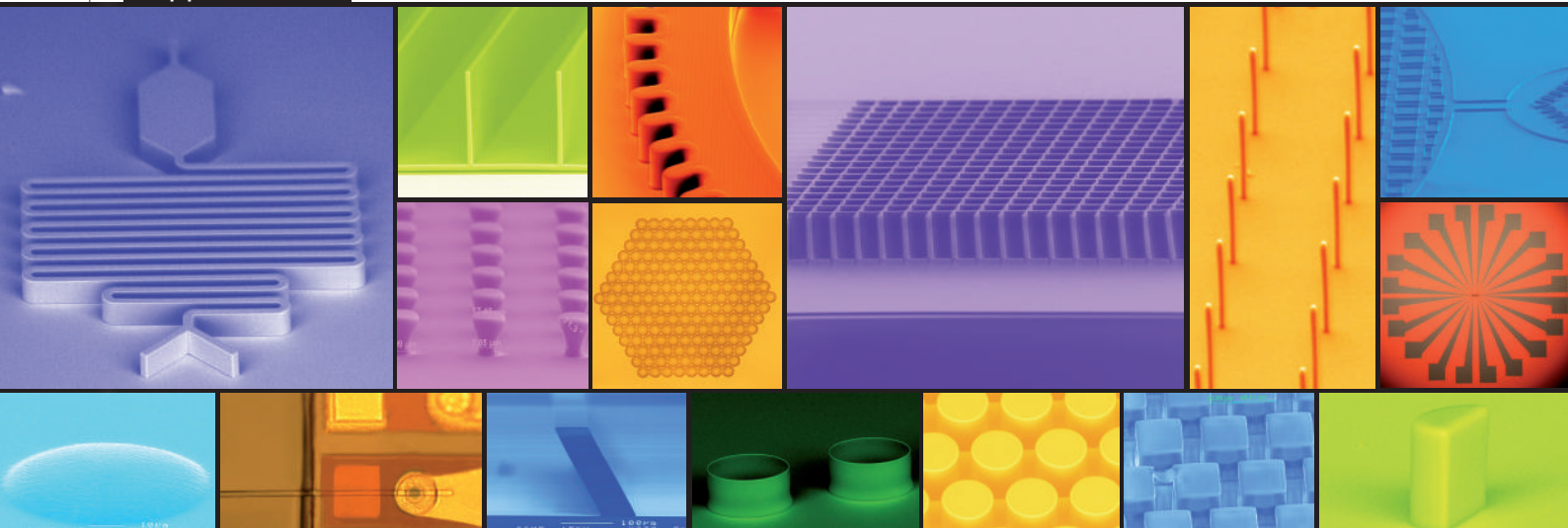
Dilase 750 is a high-end and fully customizable high-resolution laser lithography equipment. This complete direct laser processing system writes patterns in layers of blue or ultraviolet photosensitive materials. One or more (until 3) fixed sources can be installed at available wavelengths of 266 nm, 325 nm, 375 nm, 405 nm or 445 nm. The exposure surface can be extended up to 12 inches, with a standard maximum trajectory deviation of 100 nm. The different optical sub-assemblies offer several laser spot size options, all the way down to 500 nm wide. This high performance system is totally custom-made, to fit the specific prototyping or manufacturing needs of customers. Dilase 750 is compatible with most commercially available photoresists, such as SU8, Shipley and AZ resins. It is merely optimized for use with the K-CL resin developed by Kloé for fine resolution and high aspect ratio lithographic applications (1x50) or microfluidic devices fabrication.

Features

- Size : 1801 x 1204 x 1790 mm
- Integrated computer control interfaces (MS Windows based / windows OS)
- 1 or 3 laser sources : 266, 325, 375, 405 or 445 nm
- 1 to 3 optical sub-assemblies
- High resolution video positioning system
- Data formats supported : LWI (Kloé Software format), DXF, GDS2
- Automated focusing setting
- Integrated design software : Kloé Design V.2
- 3 modes of write : vectorial, raster scan and combination of both.



Applications



Performances

Linear writing speed	> 350 mm.s ⁻¹
Stage travel resolution	40 nm - 100 nm
Repeatability	100 nm
Wafer writing area	5 mm to 12 inches
Substrate thickness	250 µm to 10 mm
Laser spot size (1 or 2)	0.5 µm to 100 µm
Form factor	Minimum 10
Realignment precision	500 nm



Keys to your expectation in Optics

Dilase 3D

3D High Resolution Direct Laser Printer

- ▶ High Resolution 3D photolithography $< 10\mu\text{m}$
- ▶ Large volume fabrication $100\times 100\times 50\text{ mm}^3$
- ▶ 375 nm and 405 nm laser available
- ▶ Different resolution available
- ▶ Large depth of focus



Dilase 3D

Dilase 3D is a tabletop 3D direct laser printer. This system, dedicated to photolithography, is a high performance laser processing tool, offering high resolution 3D patterning lower than $10\mu\text{m}$. It is a perfect system for fast prototyping. Powered by fast and accurate stages, Dilase 3D allows writing 3D patterns in photosensitive resists on planar substrates up to $100\times 100\text{mm}$ and thickness of patterns until 50mm . This covers a very large volume of 3D objects.

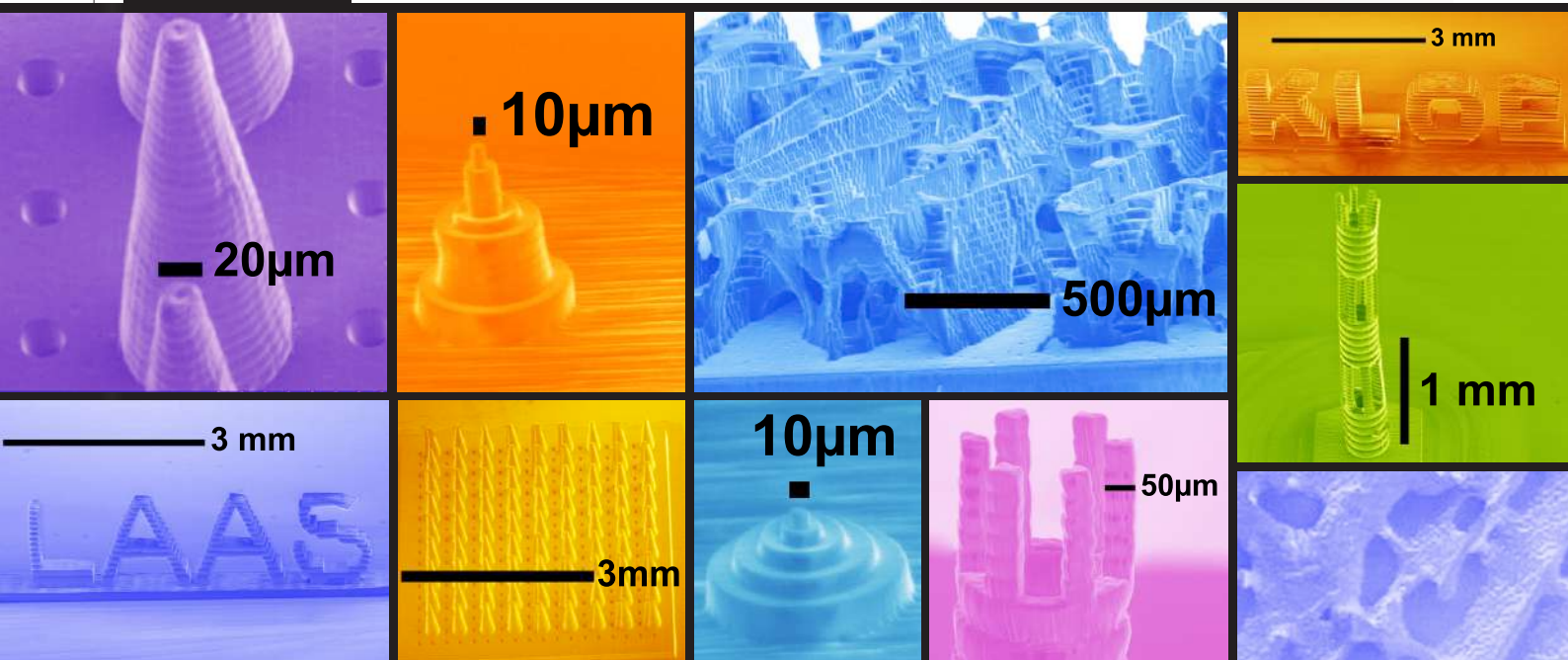
Dilase 3D is fully compatible with most of the commercially available photoresists and materials used for 3D photolithography. It can be equipped with a 375nm laser or 405nm laser sources.

Features

- Size :
- 1 laser source 375nm or 405nm
- 1 beam size minimum $5\mu\text{m}$
- Data formats: stl
- Writing step adjustable
- Integrated software: 3D slicer
- 2 modes of writing: vectorial and scanning



Applications



Performances

Linear writing speed	$> 50 \text{ mm.s}^{-1}$
Stage travel resolution	100 nm
Repeatability	100 nm
Wafer writing area	1 to 4 inches
Substrate thickness	$250 \mu\text{m}$ to 10 mm
Laser spot size (1 or 2)	$5 \mu\text{m}$ to $50 \mu\text{m}$
Form factor	Minimum 10

Courtesy of Laurent Malaquin - Renatech - LAAS

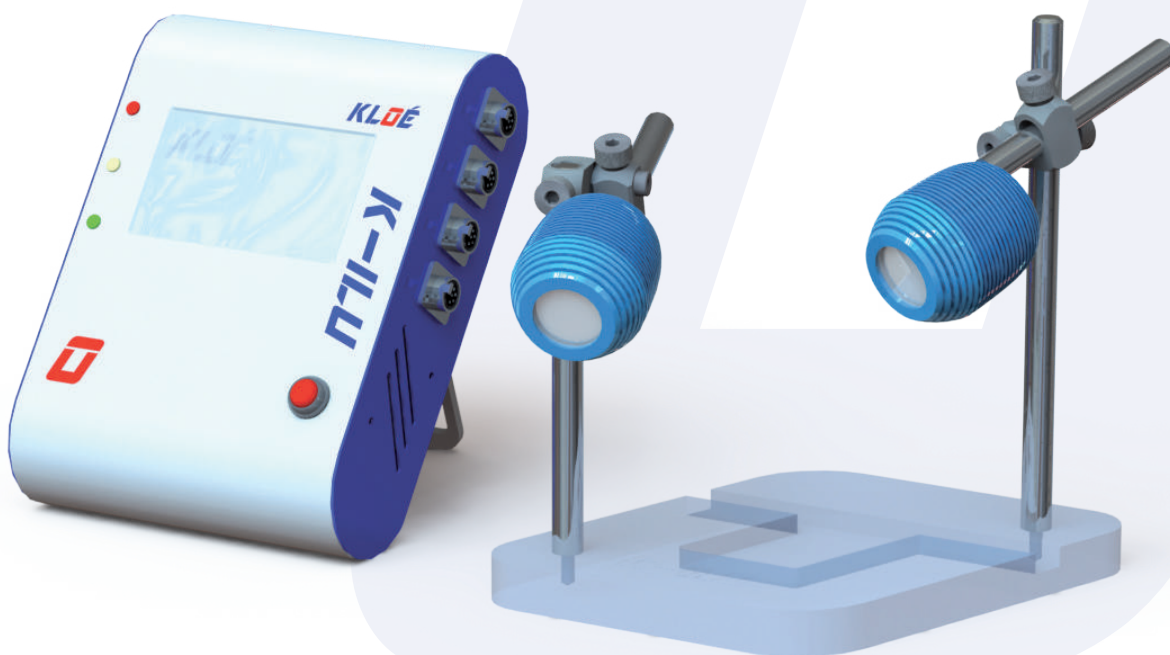


Keys to your expectation in Optics

K-ILU 2

UV LED spot curing system

- ▶ For ponctual adhesives curing
- ▶ Perfectly monochromatic at 365 or 405nm
- ▶ Collimated or focused beam
- ▶ High power density
- ▶ Low divergence angle : $< 4^\circ$
- ▶ Program memory by touchscreen

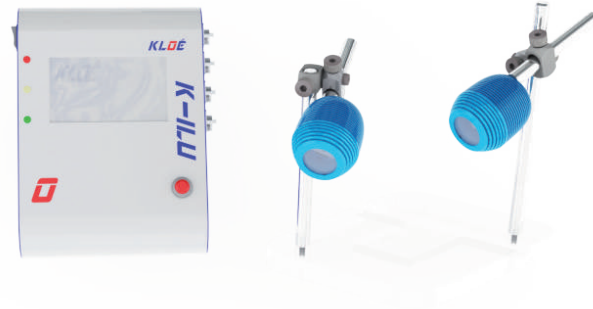


K-ILU 2

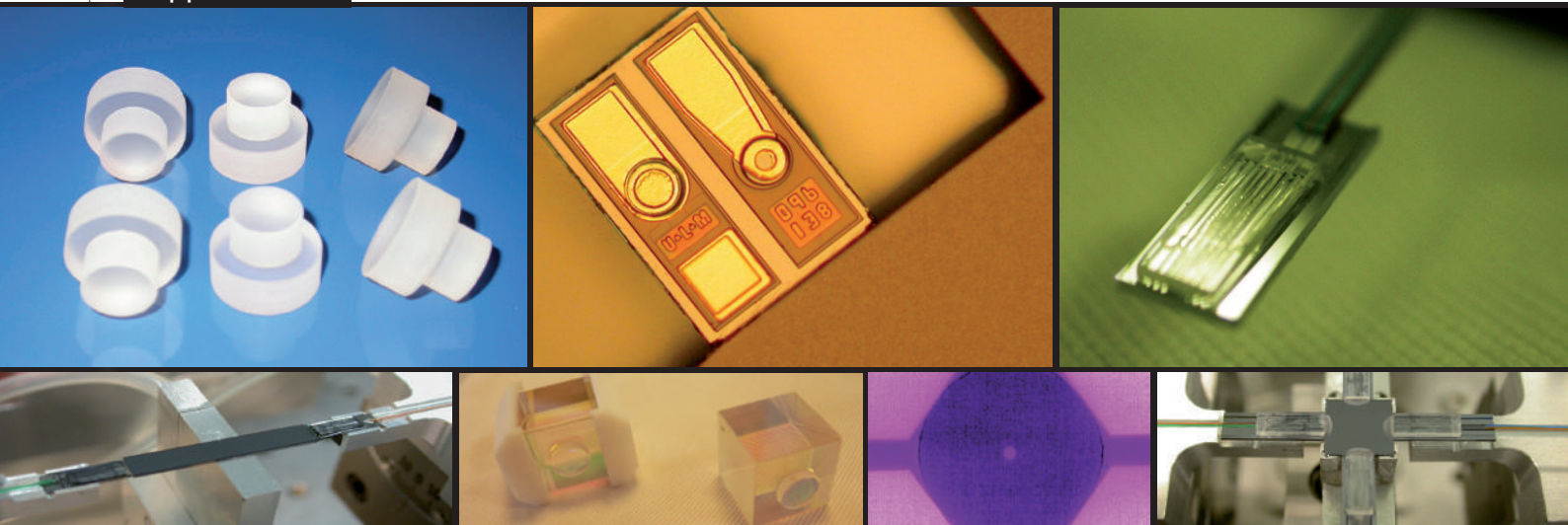
The K-ILU system is a compact UV curing system, based on 365 or 405nm emitting LED's, depending the version. This equipment is ideal for the local curing of UV adhesives or UV photopolymerization of photoresists (optics, microelectronics and medical devices...).

Features

- The K-ILU system is designed for the curing of UV adhesives in applications such as :
 - Optical elements assemblies (lenses...).
 - Optical pigtailing (optical fibers to waveguides).
 - Laser diode or photodiodes.
- Two curing modes are available :
 - Continuous mode.
 - Flash/cyclic exposure mode (recommended for very low shrinkage curing process).
- This guarantees enough time for the adhesive bond to relax between exposures, thus reducing mechanical strain and minimizing any risks of cracking.
- The UV LEDs emit a perfect monochromatic light, at 365 or 405 nm, and provide a cold UV exposure, thereby eliminating undesirable thermal effects.



Applications



Performances

- Perfectly monochromatic exposure ($\pm 5\text{nm}$), higher curing efficiency.
- Pure cold UV curing (no IR/thermal effects).
- Long LED lifetime : more than 10.000 hours of controlled real time use.
- Fully configurable parameters (light source intensity, exposure duration, cycle...).
- Registration of parameters available.
- Exposure modes available : continuous or cyclic mode.
- Compact design and low consumption.
- The UV curing heads compatible with other systems equipped with an M3 socket.

K-ILU Specifications	K-ILU 1		K-ILU 2	
Emission spectrum	365 nm \pm 5 nm		365 nm \pm 5 nm	
Beam features	collimated	focused	collimated	focused
Work distance	100 mm	40 mm	100 mm	40 mm
Exposure area diameter	20 mm	12 mm	20 mm	12 mm
Curing head power density				
Maximum divergence angle	4°	-	4°	-
Number of curing head	1		4 independants	
Maximum exposure time	continuous mode : 10 min		continuous mode : 10 min	
	flash mode : 40 min/h		flash mode : 40 min/h	
Variability of UV source intensity	0 to 100%		0 to 100%	
Program Memory	5		8	
Program	by keyboard		by touch screen	



Keys to your expectation in Optics

UV-KUB 1

UV LED masking system

- ▶ Very compact table-top system
- ▶ Perfectly monochromatic at 365nm
- ▶ Working surface up to 4 inches wafer
- ▶ Compatible with all photoresists
- ▶ Resolution : 2 μm



UV-KUB 1

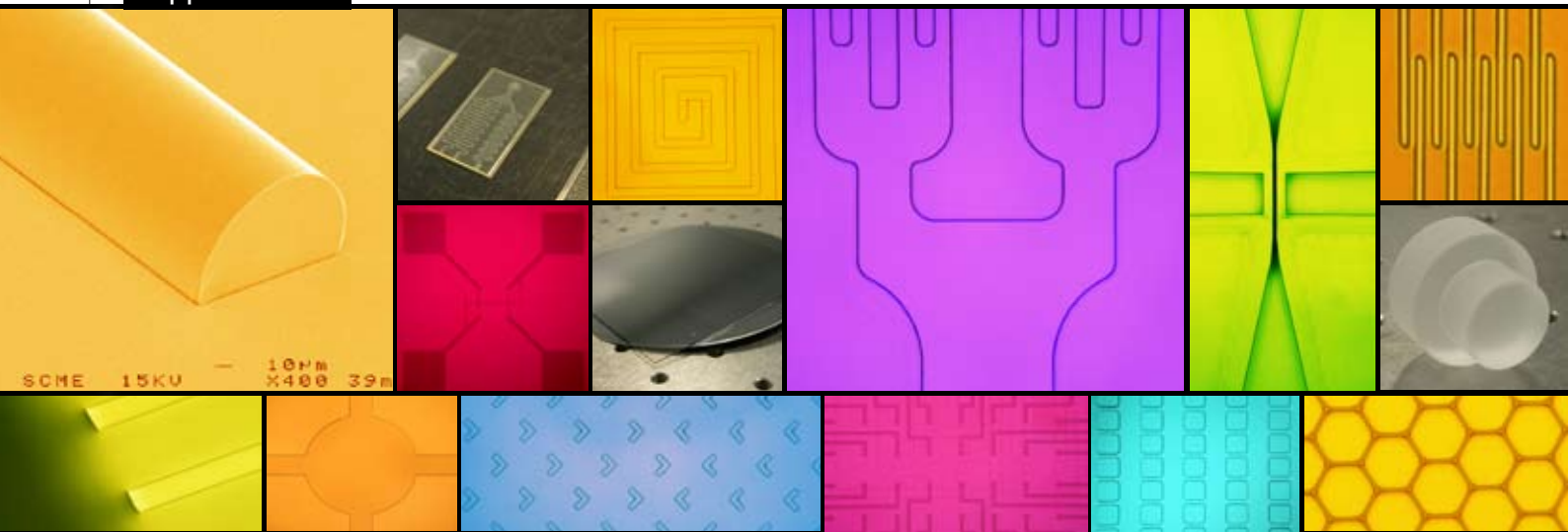
Klœ has extensive experience in photolithography through its Dilase direct laser writing technology, and thus introduces the UV-KUB system for the curing of UV light photosensitive materials. The UV-KUB is a simple exposure system based on UV LED with available light sources at 365 nm or at 405 nm, depending the version. This is a very compact table-top system capable of exposing up to 4 inches diameter wafer

Features

- A perfectly monochromatic exposure light source over the whole working surface : higher curing efficiency.
- Cold UV exposure conditions and real time in-situ temperature control of the substrate environment : providing homogeneous exposure over the whole surface, therefore prevents undesirable thermal effects.
- Long lifetime (based on LED system) : > 10 000 hours of efficient use.
- User-friendly touch screen interface for exposure cycles programming.
- Continuous or cyclic exposure modes available.
- No warm-up time required.
- Computerized control of UV source intensity adjustment is intuitive and straightforward.
- UV exposure chamber is totally hermetic : guarantees user safety
- Automated wafer loading and unloading system.
- Low consumption.



Applications



Performances

The UV-KUB 1 systems are ideal for a wide range of applications in laboratories and R&D groups dealing with optics, biotechnology, microtechnology, wafer bonding, simple layer or adhesive curing, connections, assemblies and biological or cells cultures.

Resolution	2 μ m
Emission spectrum	365 nm / 405 nm
Illumination on the surface of a 4 inches wafer	40 mW / cm ² \pm 10 %
Heating of the wafer during the insolation	< 1°C
Insolation cycle (continuous/discontinuous)	from 1 second to 18 hours
Number of memorized cycles	10
UV-KUB dimensions	260 x 260 x 260 mm
UV-KUB weight	8,2 kg / 18lbs
Color touch screen	5.7 inches diagonal
Power supply	110V / 60Hz or 230V / 50Hz
Maximum power consumption	180 Watts



Keys to your expectation in Optics

UV-KUB 2

UV LED masking system

- ▶ Very compact table-top system
- ▶ Perfectly monochromatic at 365nm
- ▶ Hard and soft contact up to 4 inches wafer
- ▶ Compatible with all photoresists
- ▶ Resolution : 2 μm



UV-KUB 2

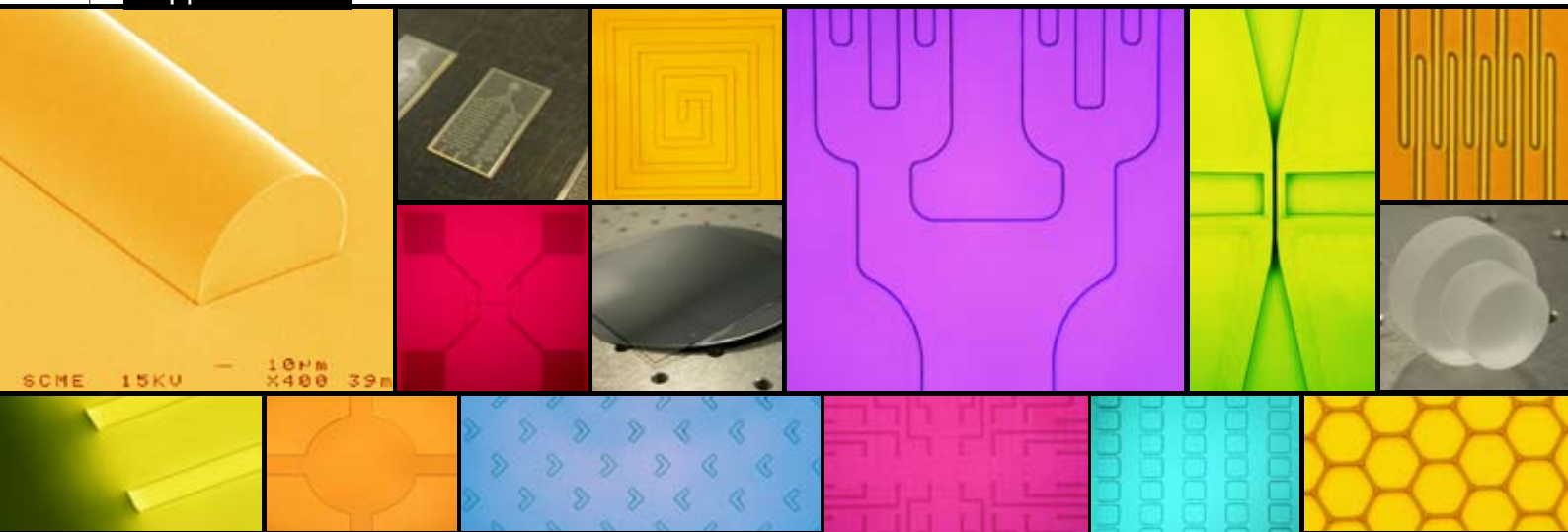
Kloé has extensive experience in photolithography through its Dilase direct laser writing technology, and thus introduces the UV-KUB system for the curing of UV light photosensitive materials. The UV-KUB is an exposure and masking system based on UV LED with available light sources at 365 nm or at 405 nm, depending the version. This is a very compact table-top system capable of exposing up to 4 inches diameter wafer. The UV-KUB system is compatible with hard (physical) or soft (proximity) contact processes, and features variable mask to substrate distance control.

Features

- A perfectly monochromatic exposure light source over the whole working surface : higher curing efficiency.
- Cold UV exposure conditions and real time in-situ temperature control of the substrate environment : providing homogeneous exposure over the whole surface, therefore prevents undesirable thermal effects.
- Long lifetime (based on LED system) : > 10 000 hours of efficient use.
- User-friendly touch screen interface for exposure cycles programming.
- Continuous or cyclic exposure modes available.
- No warm-up time required.
- Computerized control of UV source intensity adjustment is intuitive and straightforward.
- UV exposure chamber is totally hermetic : guarantees user safety
- Automated wafer loading and unloading system.
- Low consumption.



Applications



Performances

The UV-KUB 2 systems are ideal for a wide range of applications in laboratories and R&D groups dealing with optics, biotechnology, microtechnology, photolithographic processes requiring 1 masking level, wafer bonding, simple layer or adhesive curing, connections, assemblies and biological or cells cultures.

Resolution	2 μ m
Emission spectrum	365 nm / 405 nm
Illumination on the surface of a 4 inches wafer	40 mW / cm ² \pm 10 %
Heating of the wafer during the insolation	< 1°C
Insolation cycle (continuous/discontinuous)	from 1 second to 18 hours
Number of memorized cycles	10
UV-KUB dimensions	260 x 260 x 260 mm
UV-KUB weight	8,2 kg / 18lbs
Color touch screen	5.7 inches diagonal
Power supply	110V / 60Hz or 230V / 50Hz
Maximum power consumption	180 Watts



Keys to your expectation in Optics

UV-KUB 3

UV LED based compact mask aligner system

- ▶ Very compact and practical system
- ▶ Perfectly monochromatic at 365nm
- ▶ Hard and soft contact until 4 inches wafer
- ▶ Compatible with all photoresists
- ▶ Resolution : 2 μ m
- ▶ Alignment resolution : < 3 μ m
- ▶ Piloted by PAD



UV-KUB 3

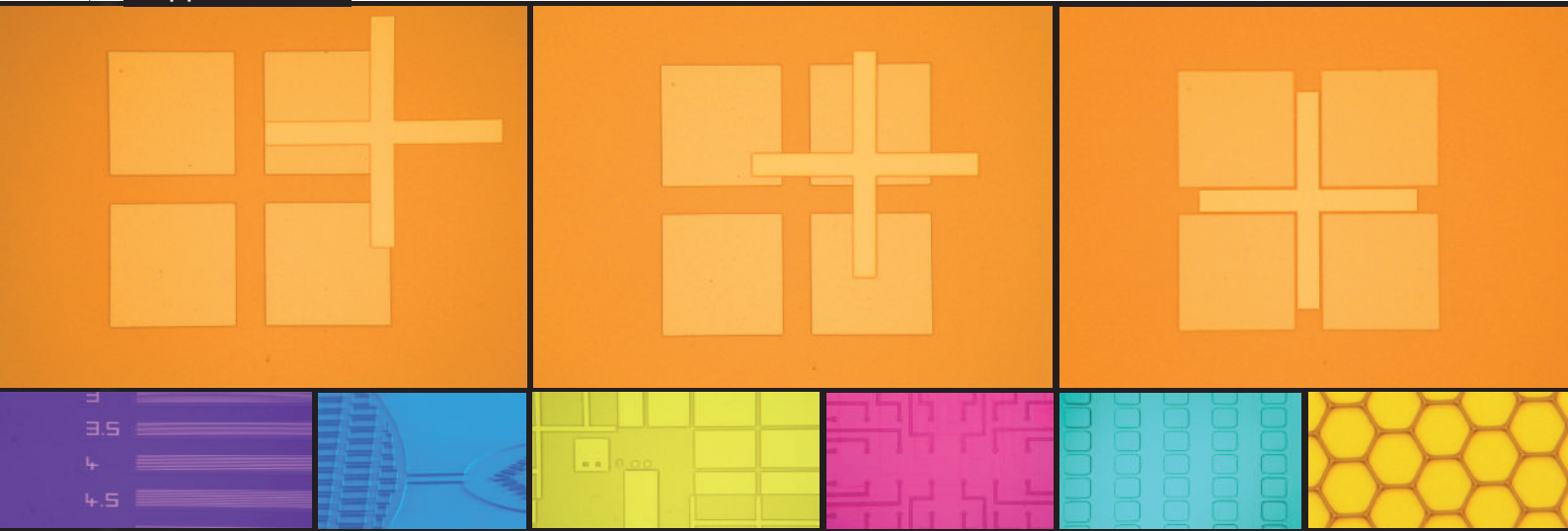
UV-KUB 3 is a UV-LED based on mask aligner system with available light sources at 365nm. This is a very compact table-top system compatible with 4 inches wafers and 100x100 mm² working surface. The minimum achievable feature size is 2 µm thanks to a specific optical arrangement offering a collimated light beam with a maximum divergence angle less than 2°. UV-KUB 3 system is compatible with both hard (physical) or soft (proximity) masking contact modes, and offers access to alignment resolutions down to 3 µm. This mask aligner system supports all standard photoresists such as AZ, Shipley, SU-8 and K-CL.

Features

- A perfectly monochromatic exposure over the wafer surface area, with a bandwidth lower than 10 nm.
- Video assisted positioning system piloted by PAD.
- Cold UV exposure and real time in-situ temperature control of the substrate environment providing homogenous exposure over the whole surface, therefore eliminating any undesirable thermal effects.
- A strong power density.
- Long LED lifetime : more than 10 000 hours of controlled real time use.
- User-friendly touch screen interface for exposure cycles programming (continuous or cyclic exposure).
- No warm-up time required.
- Computerized control of UV source intensity adjustment is intuitive and straightforward.
- UV exposure chamber is totally hermetic : garantees user safety.
- Automated wafer loading and unloading system.
- Low consumption.



Applications



Performances

The UV-KUB 3 system is ideal for a wide range of applications in laboratories and R&D groups dealing with optics, biotechnology, microelectronics, photolithographic processes requiring multilevel masking, wafer bonding, simple layer or adhesive curing, connections, assemblies and biological or cells cultures.

Critical dimension- Minimum feature size	2 µm
Alignment resolution	< 3 µm
Emission spectrum (configurations available)	365 nm
Power density	30 mW / cm ² ± 10 %
Maximum temperature variation into the chamber	< 1°C
Curing duration cycles (continuous/discontinuous)	From 1 second to 18 hours
Curing parameters- Maximum capacity	Unlimited
External dimensions	480 x 480 x 480 mm ²
Total weight	55 kg
Touch screen control panel	15.6 " diagonal, color
Power supply	110V/ 60Hz or 230V/50Hz
Maximum power consumption	180 Watts



Keys to your expectation in Optics

UV-KUB 6

UV LED masking system

- ▶ Very compact table-top system
- ▶ Perfectly monochromatic at 365 nm
- ▶ Hard and soft contact up to 6 inches wafer
- ▶ Compatible with all photoresists
- ▶ Resolution : 2 μm



UV-KUB 6

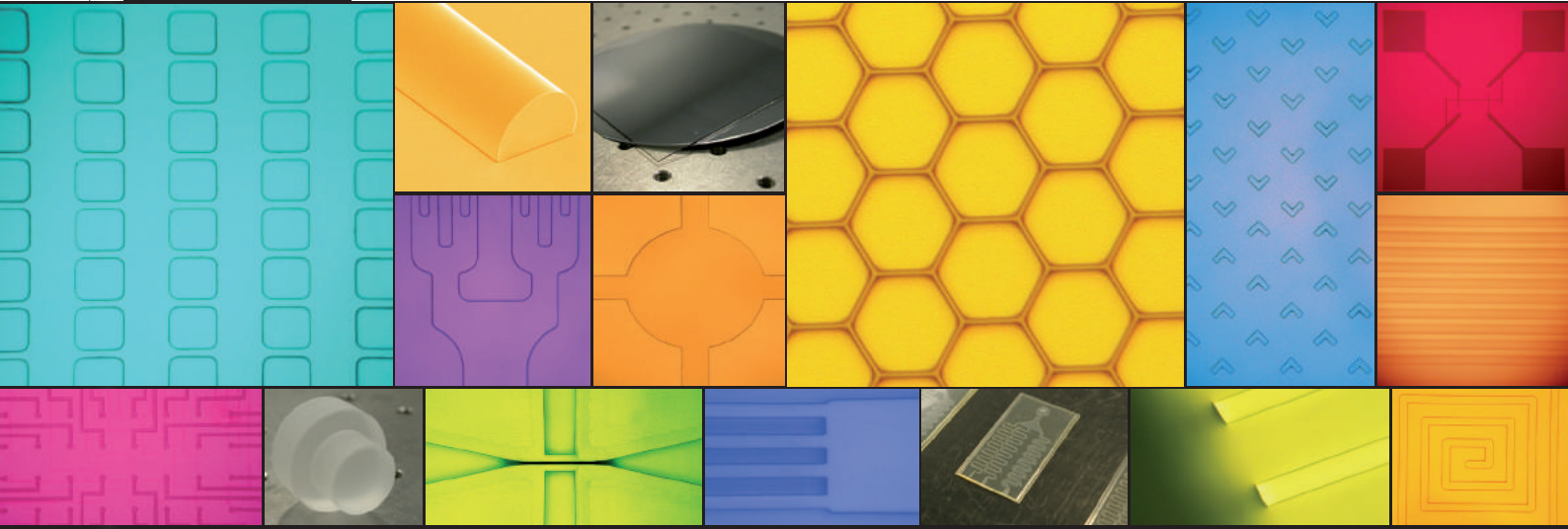
After the worldwide success of the UV-KUB 2, Kloé introduces the extended version capable of exposing up to 6 inches diameter wafer. The UV-KUB 6 is an exposure and masking system based on UV LED with available light source at 365 nm for the curing of UV light photosensitive materials. This is a very compact table-top system compatible with hard (physical) or soft (proximity) contact processes, and features variable mask to substrate distance control.

Features

- A perfectly monochromatic exposure light source over the whole working surface : higher curing efficiency.
- Cold UV exposure conditions and real time in-situ temperature control of the substrate environment : providing homogeneous exposure over the whole surface, therefore prevents undesirable thermal effects.
- Long lifetime (based on LED system) : > 10 000 hours of efficient use.
- User-friendly touch screen interface for exposure cycles programming.
- Continuous or cyclic exposure modes available.
- No warm-up time required.
- Computerized control of UV source intensity adjustment is intuitive and straightforward.
- UV exposure chamber is totally hermetic : guarantees user safety
- Automated wafer loading and unloading system.
- Low consumption.



Applications



Performances

The UV-KUB 6 systems are ideal for a wide range of applications in laboratories and R&D groups dealing with microfluidics, biotechnology, microtechnology, photolithographic processes requiring one masking level, wafer bonding, simple layer or adhesive curing, connections, assemblies and biological or cells cultures.

Resolution	2 μ m
Emission spectrum	365 nm
Illumination on the surface of a 4 inches wafer	40 mW / cm ² \pm 10 %
Heating of the wafer during the insolation	< 1°C
Insolation cycle (continuous/discontinuous)	from 1 second to 18 hours
Number of memorized cycles	10
UV-KUB dimensions	260 x 260 x 260 mm
UV-KUB weight	14.5kg / 32lbs
Color touch screen	5.7 inches diagonal
Power supply	110V / 60Hz or 230V / 50Hz
Maximum power consumption	200 Watts



Keys to your expectation in Optics

UV-KUB 9

UV LED high-powered large surface exposure system

- ▶ Very compact system
- ▶ curing of blue tape for dicing
- ▶ Wafer bonding and temporary bonding applications
- ▶ Perfectly monochromatic at 365nm
- ▶ Compatible with 4, 6, or 8 inches wafer and 7 or 9 inches mainframe.



UV-KUB 9

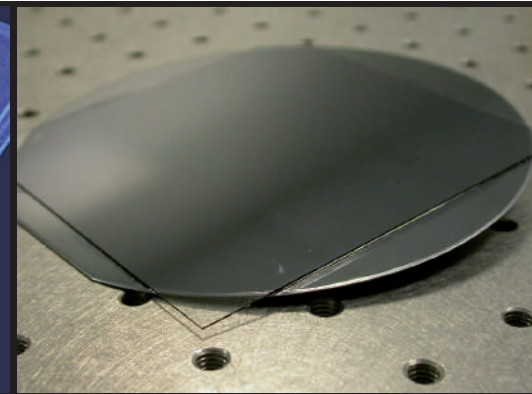
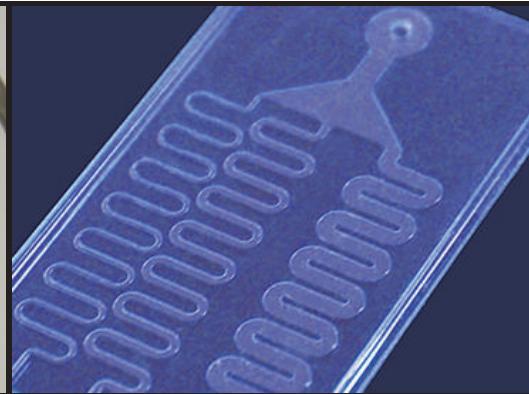
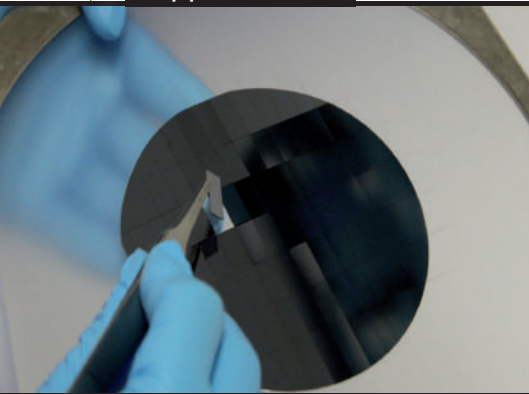
Kloé has extensive experience in photolithography through its Dilase direct laser writing technology, and thus introduces the UV-KUB system for the curing of UV light photosensitive materials. UV-KUB 9 is a UV LED high power curing system working with light source at 365nm. This is a very compact table-top system capable of exposing until 9 inches in diameter surfaces with a homogeneity better than 10% on all the working surface. This system is currently used for wafer bonding, temporary bonding and dicing blue tape curing applications.

Features

- Compatibility with 4, 6, or 8" wafers and 9" (for 8" wafer) and 7" (for 6" wafer) mainframe.
- A perfectly monochromatic exposure light source over the whole working surface : higher curing efficiency.
- Cold UV exposure conditions and real time in-situ temperature control of the substrate environment : providing homogeneous exposure over the whole surface, therefore prevents undesirable thermal effects.
- Higher power density (145mW cm^2).
- Long lifetime (based on LED system) : > 10000 hours of efficient use.
- User-friendly touch screen interface for exposure cycles programming
- Continuous or cyclic exposure modes available.
- No warm-up time required.
- Computerized control of UV source intensity adjustment is intuitive and straightforward.
- UV exposure chamber is totally hermetic : guarantees user safety.
- Low consumption.



Applications



Performances

- The UV-KUB 9 system is ideal for a broad range of applications in laboratories and R&D groups dealing with blue tape for dicing.
- It is also very well adapted for wafer bonding and temporary bonding application.

Emission spectrum	365 nm \pm 5 nm
Illumination	145 mW/cm ² +/- 5%
Heating of the wafer during the insolation	< 2°C
Insolation cycle	From 1 second to 1 hour
Number of memorized cycles	10
UV-KUB 9 dimensions	350x350x350mm
UV-KUB 9 weight	22kg - 44 lbs
Color touch screen	5.7 inches diagonal
Power supply	110V/60Hz - 230V/50Hz
Maximum consumption	800Watts
Exposure time for blue tape curing	ADWILL D650 : 15 sec ADWILL D175 P370 : 45 sec



Keys to your expectation in Optics

K-CL

Thick negative photoresist

- ▶ Hybrid sol-gel process
- ▶ Photosensitive between 325 and 405 nm
- ▶ Better mechanical properties than polymers
- ▶ Thin film but also thick layers up to 350µm available
- ▶ Biocompatible material



K-CL

These negative photoresists were developed by the Kloé materials department and are specifically intended for use in photolithography and microstructure lithographic applications. These resins are synthesized via a sol-gel process using organo-mineral precursors, which yields a structure of overlapping organic and mineral networks. The organic groups confer compliance and photosensitive properties to the layer, while the mineral portion contributes to the mechanical and thermal stability of the layer.

In addition, these photoresists offer a great flexibility of use. Layers can be deposited by spin, dip or spray-coating techniques onto a range of substrate materials such as glass, semi-conductor, metal, polymer and more. Furthermore, the thickness of the deposited resist layer can be adjusted from a few hundred nanometers to 350 microns and more depending the version of K-CL, while still yielding high resolution lithography on large and small surfaces. This resist is suitable for high aspect ratio and thick layers applications. Moreover K-CL-010 has been qualified by customers as biocompatible material.

Features

Storage :

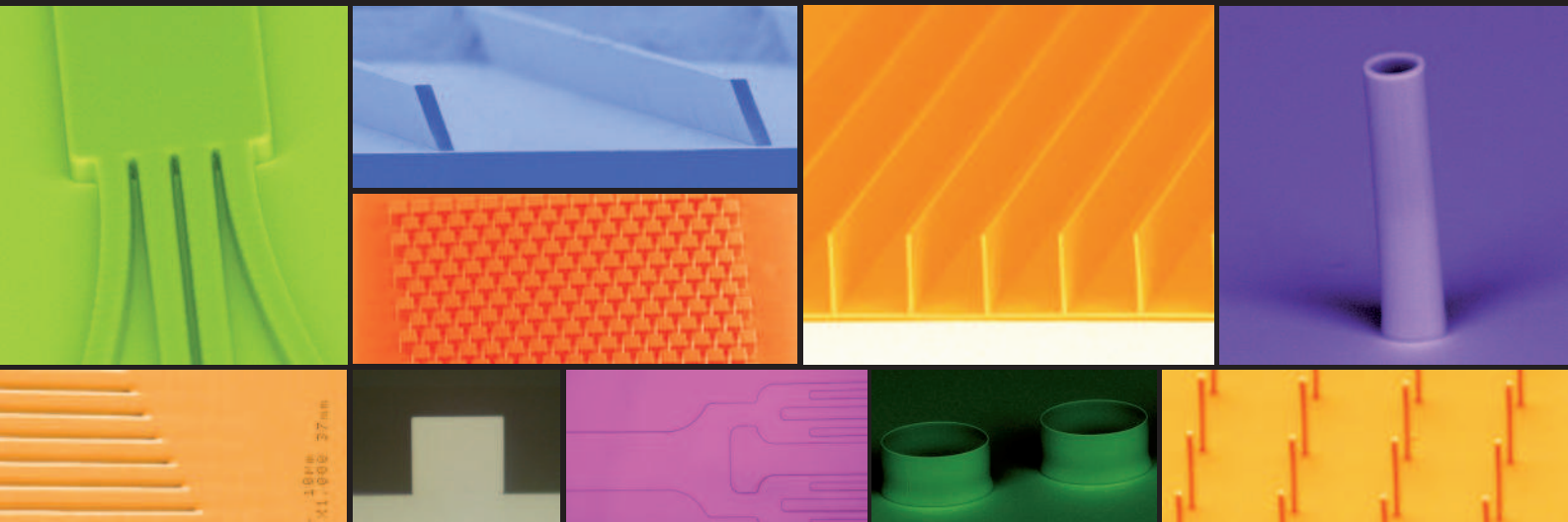
- Shelf life : 6 months if stored at -15°C
- K-CL resins should be kept in tightly sealed containers and in a properly vented storage area, away from heat, strong oxidants, UV rays and moisture.

Application :

- The K-CL photoresists were developed by Kloé to be used in applications demanding reliable photosensitivity, mechanical resistance and high form factor compatibility. These applications include but are not limited to :
- Microfluidic ▪ Lithography resists ▪ Microstructure layers ▪ Micro optical elements ▪ Pixelized optics



Applications



Performances

Composition	Hybrid sol-gel, material based on methacrylate
Viscosity	Between 10 and 150 cP at 20°C
Layer thicknesses (one pass)	Between 500 nm and 150 µm
Form factor	Up to 1x80
Photopolymerization sensitivity (UV)	From 325 to 405 nm
Refractive index (at 633 nm)	Between ~1.525 and ~1.540
Thermal resistance	Up to 120°C
Mechanical resistance	RIE, DRIE, Plasma etching compatible
Development	Alcoholic solution

K-NG

Greyscale Negative Photoresist

- ▶ Hybrid sol-gel process
- ▶ Photosensitive between 325 and 405 nm
- ▶ Better mechanical properties than polymers
- ▶ Thin film but also thick layers up to 200µm available
- ▶ High optical transmission properties in visible and NIR range



These photoresists were developed by the Kloé materials department and are specifically intended for use in photolithography and microstructure lithographic applications. These resist are synthesized via a sol-gel process using organo-mineral precursors, which yields a structure of overlapping organic and mineral networks. The organic groups confer compliance and photosensitive properties to the layer, while the mineral portion contributes to the mechanical and thermal stability of the layer.

In addition, these photoresists offer a great flexibility of use. Layers can be deposited by spin, dip or spray-coating techniques onto a range of substrate materials such as glass, semi-conductor, metal, polymer and more. Furthermore, K-NG is especially suitable for greyscale realization of a few hundred of nanometers to 100 microns thick.

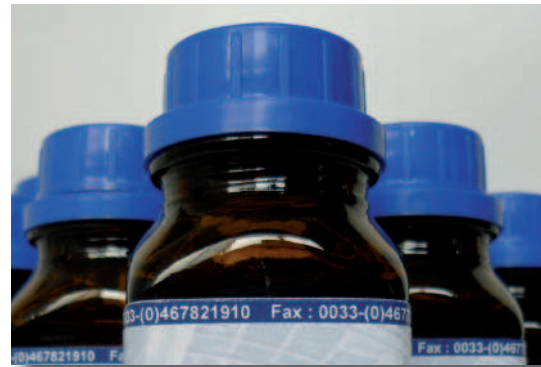
Features

Storage :

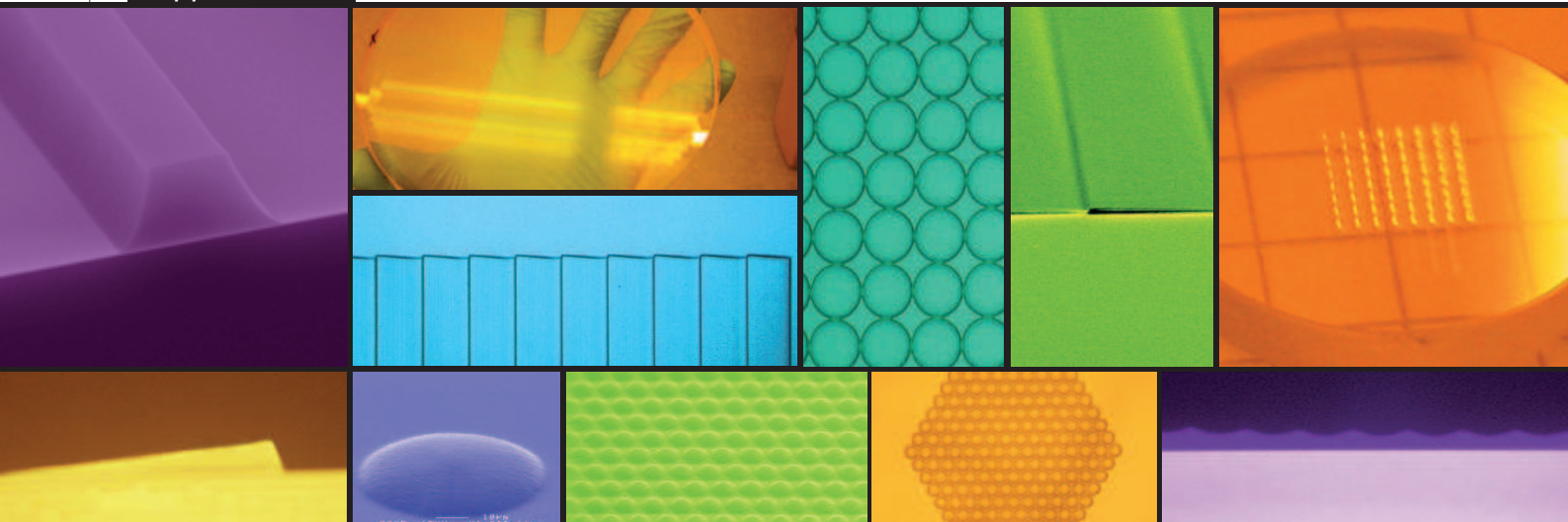
- Shelf life : 6 months if stored at -15°C. K-NG resist should be kept in tightly sealed containers and in a properly vented storage area, away from heat, strong oxidants, UV rays and moisture.

Application :

- The K-NG photoresists were developed by Kloé to be used in applications demanding reliable photosensitivity and mechanical resistance compatibility.
- Microlenses ▪ Blazed grating ▪ Holography
- Other greyscale applications



Applications



Performances

Composition	Hybrid sol-gel, material based on methacrylate
Viscosity	Between 10 and 150 cP at 20°C
Layer thicknesses (one pass)	Between 1 µm and 100 µm
Greyscale application	Microlenses - Blazed grating...
Photopolymerization sensitivity (UV)	From 325 to 405 nm
Refractive index (at 633 nm)	Between ~1.555
Thermal resistance	Up to 120°C
Mechanical resistance	RIE, DRIE, Plasma etching compatible
Development	Alcoholic solution

K-PX

Optical adhesives

- ▶ Based on organic-inorganic hybrid compositions
- ▶ Sol-gel process
- ▶ Low CTE
- ▶ Better mechanical properties than polymers
- ▶ Broad range of adhesives : K-PU, K-PUM, K-PUT, K-PTx



K-PX

The K-Px range of adhesives, developed and patented by Kloé, is synthesized via a sol-gel process using organo-mineral precursors, which yields a structure of overlapping organic and mineral networks. The organic groups enable adhesive reticulation by UV exposure and confer compliance to the final structure. The mineral network is responsible for the mechanical strength and thermal stability of the product. These solutions have a very low coefficient of thermal expansion (CTE) and have been developed by successfully adapting ratios of mineral (CTE<0) to organic (CTE>0) groups. The flexibility of this sol-gel development process allows Kloé to produce long shelf life optical adhesives, compatible with hybrid bonding on glass, metals, semi-conductors, polymers and more.

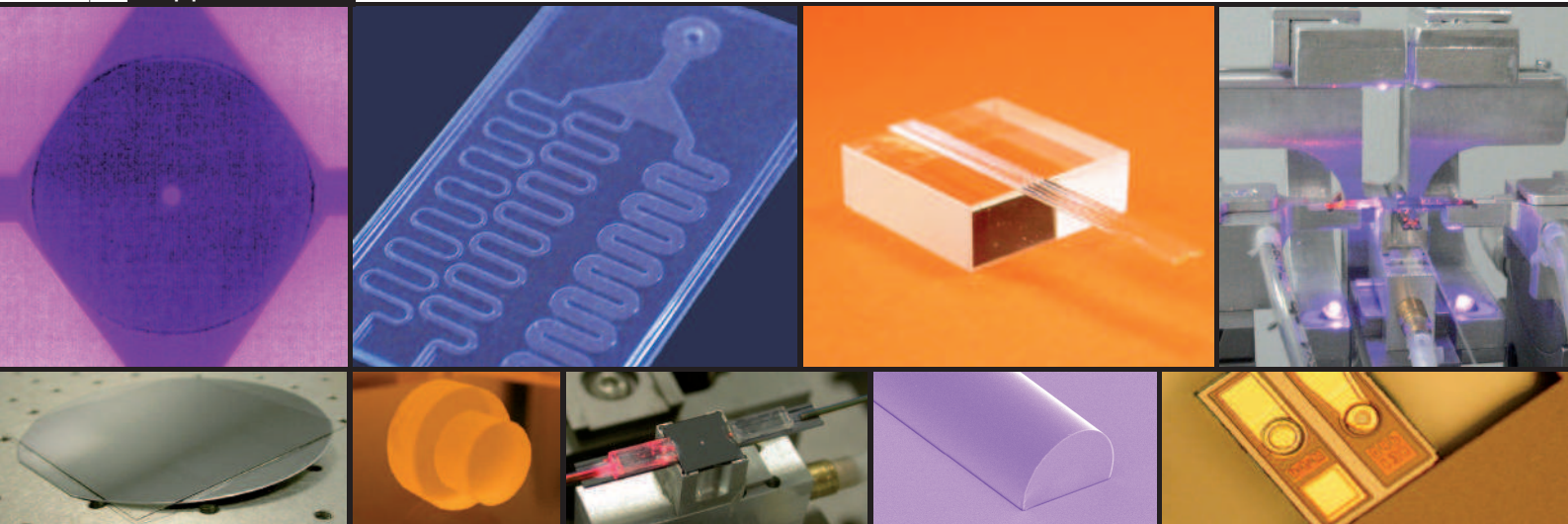
Features

Series of adhesives :

- **K-PU** : single component UV-adhesive (with a very low CTE).
- **K-PUM** : high surface and volume reactivity, high adherence, single component UV adhesive.
- **K-PUT** : high thermal resistance (single component UV adhesive).
- **K-PTx** : thermal curing adhesive, curing at low temperature (<120°C).



Applications



Performances

K-Px Products	K-PU	K-PUM	K-PUT	K-PTx
Viscosity cP at 20°C	75	250	80	5 to 1000
Refractive Index at 633nm	1.51	1.52	1.51	1.43
Appearance	Light yellow	Light yellow	Colourless	
Thermal resistance	-40°C to 170°C	-40°C to 220°C	-40°C to 250°C	