EXAMPLES OF INDUSTRIAL APPLICATIONS

STEEL FOIL M-DRILLING
- No melting
- Micron diameter

Applications:
- Filters
- Functional surfaces

DIAMOND CUTTING
- Low carbonization
- No HAZ
- Low material loss

Applications:
- Diamond sheet cutting
- Chip breaker formation
- Diamond texturing/patterning

GLASS HOLES
- Various hole sizes with routine tapper angle better than 5 deg
- Minimal debris around the edges of holes

Application:
- Microfluidics
- VIAs

NANO RIPPLES
- Up to 200 nm ripple period fabricated using ultra-short laser pulses
- Individual nano-feature size on ripples: 10 – 50 nm
- Controlled period, duty cycle and aspect ratio of the ripples

Application:
- Detection of materials with increased sensitivity using surface-enhanced Raman scattering (SERS)
- Bio-sensing, water contamination monitoring, explosive detection etc.

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METAL MICROMACHINING
- 3D structures formed on steel surface
- High precision and surface smoothness achieved

MARKING OF CONTACT LENS
- Marking made inside the bulk of contact lens, preserving surface of lens and distortions
- Exact positioning of markings – 3D text format

Application:
- Product counterfeit protection
- Serial number and customer identification

THIN GLASS DRILLING
- Taper angle control
- Low heat affect
- No cracking or chipping around holes

Applications:
- VIAs

DATAMATRIX
- Data inscribed on a glass surface or inside bulk
- Extremely small elements, down to 5 μm in size

Application:
- Product marking

GLASS TUBE DRILLING
- Controlled damage and depth
- Hole diameter of few microns

Applications:
- Medical applications
- Biopsy equipment
Ultrafast Lasers

FERROELECTRIC CERAMICS ETCHING
- No or low melting and HAZ
- Easily removable debris
- Good structuring quality

Applications:
- Infrared sensors for cameras
- Memory chips

SILICON LASER ASSISTED ETCHING
- No HAZ
- No melting

Applications:
- Solar cell production
- Semiconductor industry

MASK FOR BEAM SPLITTER PATTERN DEPOSITION
- Borosilicate glass
- 150 μm thickness
- ~900 holes per mask
- Mask diameter 25.4 mm

Application:
- Selective coating

STENT CUTTING
- Holes in stent wall, cross-section view
- Polymer stent
- No heat effect, no debris
- Minimal taper effect

Application:
- Vascular surgery

TEXTURIZED SAPPHIRE SURFACE
- Micron resolution
- Large area processing
- Single pulses used to form craters on the surface

Application:
- Better light extraction in LED
- Semiconductor structure growth

MARKING AND PATTERNING
- Smallest spots down to 3 μm in width
- Micron level positioning
- No heat effect

MICRO CHANNEL FORMATION
- Wide range of materials – from fused silica to polymers
- Controllable channel shape
- Low debris
- Smooth surface

Applications:
- Microfluidic sensors
- Waveguides

OPTICAL FIBER DRILLED TO THE CORE
- Diameter from <10 μm
- Various hole profiles possible
- Depth and angle control

Applications:
- Optical fiber sensors
- Material science

OPTICAL FIBER SCATTERING
- No impact on fiber strength
- No surface damage
- Even light dispersion

Applications:
- Medical fibers
- Oncology

SYNTHETIC RUBY DRILLING
- No cracks after drilling
- Taper angle control

Application:
- High precision mechanical parts
GLASS BULK PROCESSING
- Refractive index volume modification
- Bragg gratings with 99% diffraction efficiency
- Birefringent gratings/elements
- Low influence on strength of the substrate

SELECTIVE METAL COATING ABLATION (REMOVAL)
- Selective ablation of metal coatings from various surfaces
- Depth and geometry of ablation may vary

Application:
- Lithography mask production
- Beam shaping elements
- Optical apertures
- Other

NON TEMPERED GLASS CUTTING
- Thickness: 0.03 – 0.3 mm
- Mechanical or heat assisted break after scribing
- Speed: up to 800 mm/s
- Any shape
- Round corners
- Surface quality: Ra ≤ 2μm

TEMPERED GLASS CUTTING
- Single pass process
- In bulk damage (closed cut), surface remains intact, practically no debris
- Homogeneous cut surface

SAPPHIRE CUTTING
- Thickness: 100 – 900 μm
- Easy to break
- Circle shapes diameter: 3 – 15 mm
- Corner radius: from 0.5 mm
- Speed: up to 800 mm/s
- Cut quality: Ra ≤ 2 μm
- No surface cracks
- No or low chipping
- Non ablating process

500 μm
Birefringence modification inside fused silica. Photo in crossed polarized light

100 μm
Amplitude grating formation

50 μm
Titan coating selective ablation

50 μm
Apperture array fabrication

50 μm
Gold layer removal without damaging to MgO substrate – Au layer removal without damaging

50 μm
Chrome ablation from glass substrate

200 μm
Thickness: 420 μm, clear sapphire

50 μm
Glass

50 μm
Sapphire

S-waveplate *

200 μm
S-waveplate *

50 μm
Chrome ablation for beam shaping

200 μm
GLASS BULK PROCESSING

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SAPPHIRE DICING FOR LED INDUSTRY

- Wafer thickness 50 to 330 μm
- Narrow street width up to ~10 μm
- Bending strength (650–900 MPa)
- High light extraction efficiency
- Controllable damage length
- Easy breaking
- Scribing with DBR coated backside of sapphire

SILICON CARBIDE DICING

- No chipping on the edges
- Cleaved-surface roughness <1 μm
- Easy breaking

Applications:

- High power, high frequency electronics

Samples provided by Evana Technologies
www.evanatech.com