EXAMPLES OF INDUSTRIAL APPLICATIONS

PROCESSING OF SOLAR CELLS
Applications:
- Front contact formation
- Back contact formation

EDGE ISOLATION FOR SOLAR CELLS

SELECTIVE DIELECTRIC LAYERS REMOVAL FOR SOLAR CELLS

LASER MARKING OF SOLAR CELLS

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.

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

MARKING OF CONTACT LENS
Application:
- Product counterfeit protection
- Development of novel products

DRILLING THIN TRANSPARENT MATERIALS
- Taper angle control
- Low heat affect
- No cracking around holes

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

Applications:
- Diamond sheet cutting
- Diamond texturing/patterning

STEEL FOIL M-DRILLING
- No melting
- Micron diameter

Applications:
- Filters
- Functional surfaces
FERROELECTRIC CERAMICS ETCHING
- No or low melting
- 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

DATAMATRIX
- Data inscribed on a glass surface
- Extremely small individual elements, up to 5 μm in size

Application:
- Product marking

HOLOGRAM PRODUCTION
- Example: hologram view generated using glass sample

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

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

Application:
- Microfluidics

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

GLASS TUBE DRILLING
- Controlled damage and depth

Applications:
- Tissue biopsy equipment
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

GLASS BULK PROCESSING
- Refractive index modification
- Bragg gratings with 99% diffraction efficiency
- Birefringent gratings/elements
- Low influence on strength of the substrate

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

Applications:
- Optical fiber sensors
- Material science

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

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

Applications:
- Medical fibers
- Oncology

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

Applications:
- Microfluidic sensors
- Waveguides

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 visible chipping
- Non ablating process

Thickness: 420 μm, clear sapphire

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

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

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

Samples provided by Workshop of Photonics
www.wophotonics.com

Samples provided by Evana Technologies
www.evanatech.com

 Thickness: 200 μm

 Thickness: 200 μm

 Thickness: 20 μm

 Thickness: 50 μm

 Thickness: 50 μm

 Thickness: 50 μm