

Your Vision, Our TGV Solutions

雷射微加工 Laser Micro Machining

TGV : Through Glass Vias

TCV : Through Ceramic Vias

TSV : Through SiC / Si Vias

TDV : Through Diamond Vias

Hi-Nano's Fab 1 and Fab 2 are located at
Yi-Lan Science Park, Taiwan.

Laser Micromachining Innovations

Our Core Areas of Expertise:

1. AR/VR Lens and Waveguide Wafer Laser Processing
2. Optical Glass Laser Cutting and Micro-Hole Drilling
3. TGV (Through Glass Vias) and Glass Core Solutions for FOPLP
4. TGV Laser Repair Technology
5. Precision Laser Machining of Sintered SiC and Ceramics
6. Laser Dicing Technology for SiC Semiconductor Wafers and Substrates
7. Advanced Laser Singulation for 2.5D and 3D IC Packaging
8. Innovative Square-Holed Glass Guide Plates for High-End IC Vertical Probe Cards
9. Laser Processing for Co-Packaged Optics Applications
10. Laser Processing of CBN (Cubic Boron Nitride) and Lab-Grown Diamonds
11. Customized Micro Lens Array (MLA) Development
12. and many more innovative laser processing solutions

If you need any further refinement or want to match a specific style, please let us know!

Hi-Nano's laser micromachining expertise transcends boundaries, enabling precise solutions for diverse applications. From cutting-edge semiconductor technologies to intricate glass structures and CVD diamonds, our innovations underscore the versatility and efficiency of laser micromachining in driving advancements across industries.



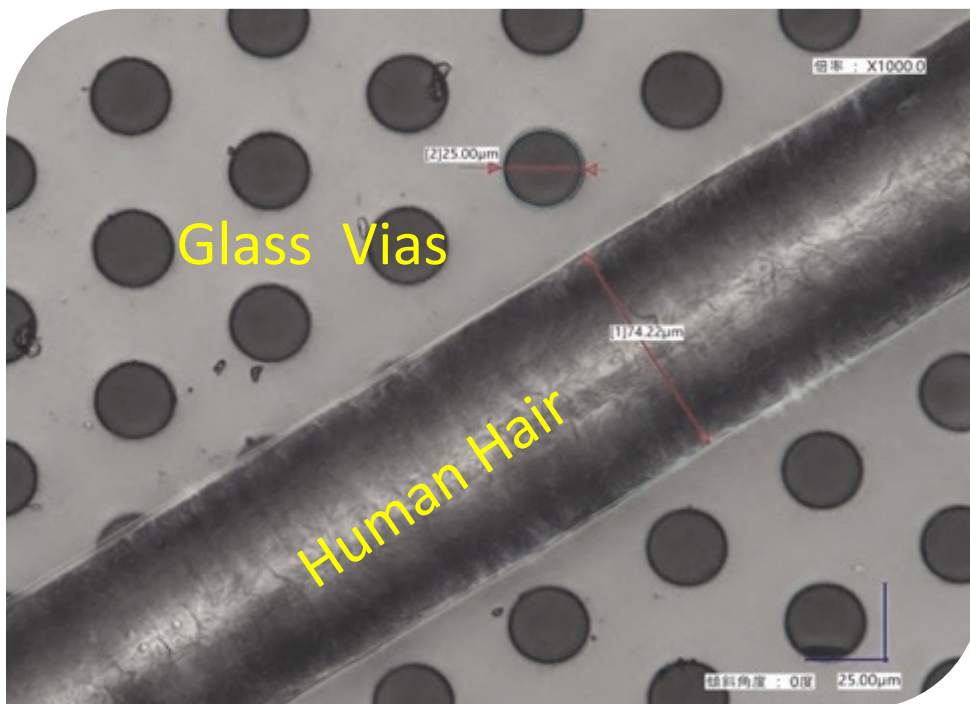
Hi-Nano Optoelectronics Co., Ltd.

TGV and Glass Core Technology

1. Precision Beyond Limits:

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Explore Hi-Nano's groundbreaking Technology Through Glass Vias (TGV) and Glass Core, setting new standards in precision and quality. Our hole drilling technology achieves **diameters** as small as **8 ~ 100 micrometers**, catering to glass substrates with thickness ranging from **10 um** to **1000 um**.



The image above illustrates the remarkable precision of our micromachining capabilities. The tiny holes drilled in glass measure just **25 microns** in diameter, a fraction of the thickness of a **human hair (75 microns)**. This level of detail demonstrates our expertise in overcoming the challenges associated with TGV technology. In fact, we can create even smaller holes upon request. When precision is paramount, remember: we are your partner for TGV solutions



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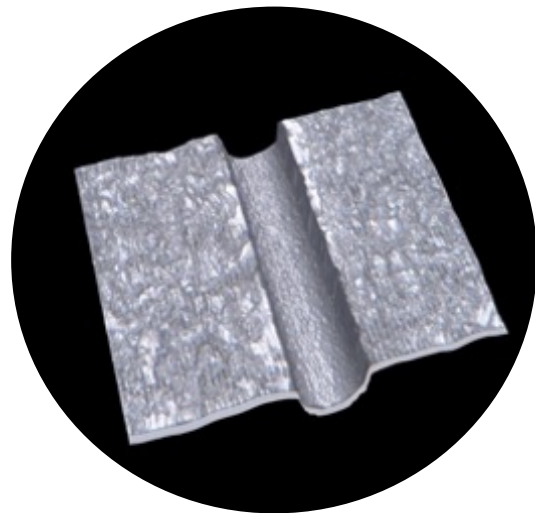
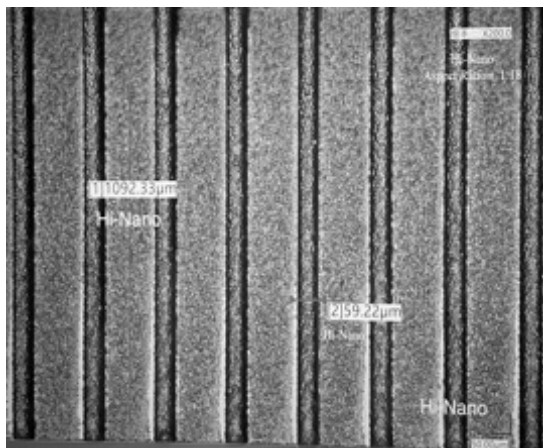
TGV Showroom:

Precision in Every Detail

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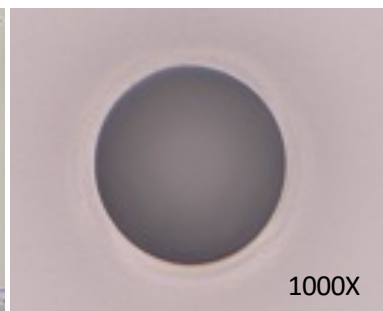
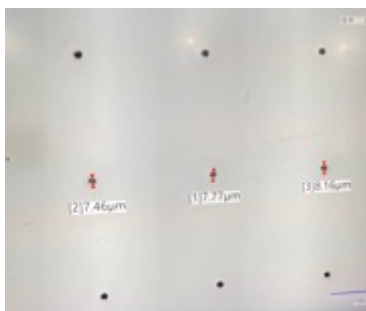
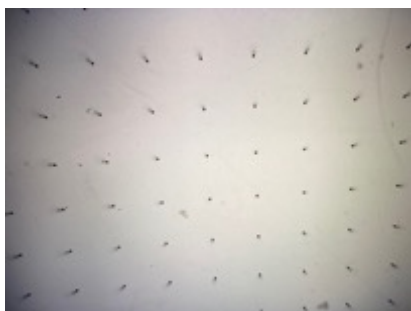
2. Aspect Ratios are exceeding the expectation of the market:

Hi-Nano is pushing boundaries. While the market averages at 1:10, our aspect ratios soar to an impressive **1:30 and higher**. This remarkable achievement ensures that our glass hole drilling technology meets and exceeds all market requirements, positioning us as pioneers in the industry.



3. Pioneering the Future of Glass Substrates:

Hi-Nano is driving innovation in glass substrate technology. Our TGV and Glass Core technologies offer unparalleled precision and quality for advanced 3D IC packaging. With industry-leading **hole diameters as small as 8 µm and aspect ratios up to 1:30, and beyond**, we're setting new standards. We're committed to empowering our customers with the competitive edge they need to succeed.



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Your Vision, Our Precision:

TGV Applications

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4. Major application markets for TGV technology include:

- 1) Advanced Semi. 2.5D and 3D packaging
- 2) FOPLP and CoPoS advanced Packaging
- 3) 5G, 6G, and LEO RF telecommunication substrates
- 4) Glass interposers and Glass Core
- 5) MEMS
- 6) IPDs. (Integrated Passive Devices)
- 7) Co-packaged photo devices (CPO)
- 8) Silicon Photonics packaging

These are just a few of the many applications for TGV technology. As the technology continues to develop, we can expect to see even more innovative and exciting applications emerge.



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TGV Machining Excellence

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5. TGV Machining Features (Max. 510 x 515 mm)

Our advanced TGV machining processes deliver exceptional results:

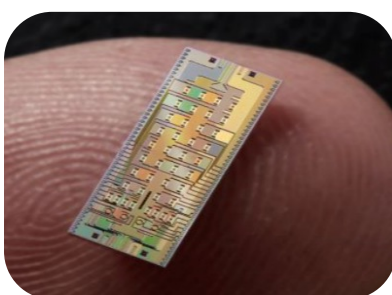
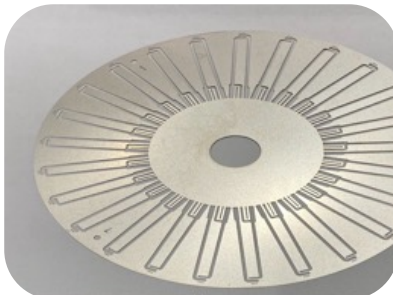
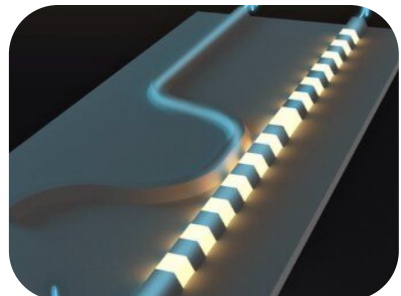
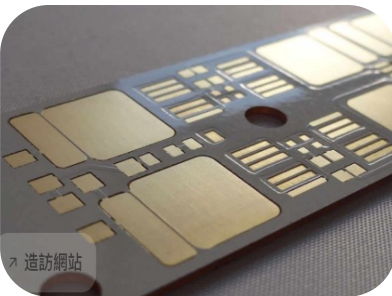
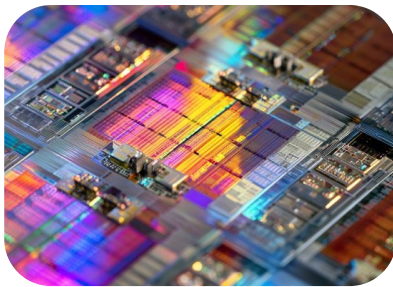
- 1) **Achieved Minimum Hole Diameter:** ~ 8 μm
- 2) **Adjustable Hole Profile:** Hourglass shape or straight wall options available.
- 3) **High Aspect Ratio:** Up to 1:30 or higher upon request.
- 4) **Fine Inner Wall Roughness:** $R_a < 0.1 \mu\text{m}$ and $R_z < 0.2 \mu\text{m}$.
- 5) **Hole Entrance and Exit Roundness:** Virtually 100% perfect Hole Circularity.
- 6) **Minimal Chipping:** Typical < 10 microns or none
- 7) **No Micro Cracks Formation:** Prevent structural weaknesses and enhance reliability.
- 8) **High Uniformity and Yield:** Near 100% yield achievable in most applications.
- 9) **High Precision Hole Location:** Achievable down to submicron accuracy.
- 10) **Stable Repeatable Capability:** Proven and mature processes for high-volume production.

These superior characteristics set our TGV machining apart and ensure optimal performance in your applications.



Materials We Machine

1. Optical Glass and Quartz
2. CBN , Lab-Grown Diamond and Sapphire
3. Silicon and Silicon Carbide (SiC)
4. Ceramics, AlN, and Silicon Nitride
5. Polymers and Polyimide (PI)
6. Thin Metals
7. Advanced Materials
8. As well as many other challenging materials



Services & Products

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Our services and products are designed to streamline your micromachining journey, offering excellent solutions that redefine possibilities.

1. R&D and Job shop Services:

Benefit from our expertise and cutting-edge laser systems. Hi-Nano's job shop services guide you seamlessly from new product experiments to mass production, reducing investment and time. Mitigate risks, shorten time to market, and confidently navigate micromachining challenges



2. Customized Laser Systems:

Elevate your capabilities with Hi-Nano's high-precision laser systems. Our experienced engineering team crafts solutions tailored to your requirements, ensuring peak performance in materials processing, semiconductor equipment manufacturing, and automation. Experience precision redefined.



Partner with Precision

Our location:

Nestled within [Yilan Science Park](#) in the northeastern region of Taiwan, our surroundings are embraced by mountains on three sides, while the other side opens up to the vast expanse of the Pacific Ocean. This green haven boasts clean air, creating an ideal environment for innovation and supporting pollution-free high-tech industries.

Effortless Accessibility:

Despite its countryside charm, our location is easily accessible.

[Just a 40-minute drive from Taipei-101](#)

and [less than 2 hours from Taoyuan International Airport](#),

Yilan Science Park seamlessly combines the convenience of transportation with the serenity of nature.

Contact us anytime you face micromachining challenges, have an ambitious project, or need assistance in turning your ideas into reality. Our team of experts is dedicated to providing comprehensive solutions tailored to your specific needs.

Contact Information:

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