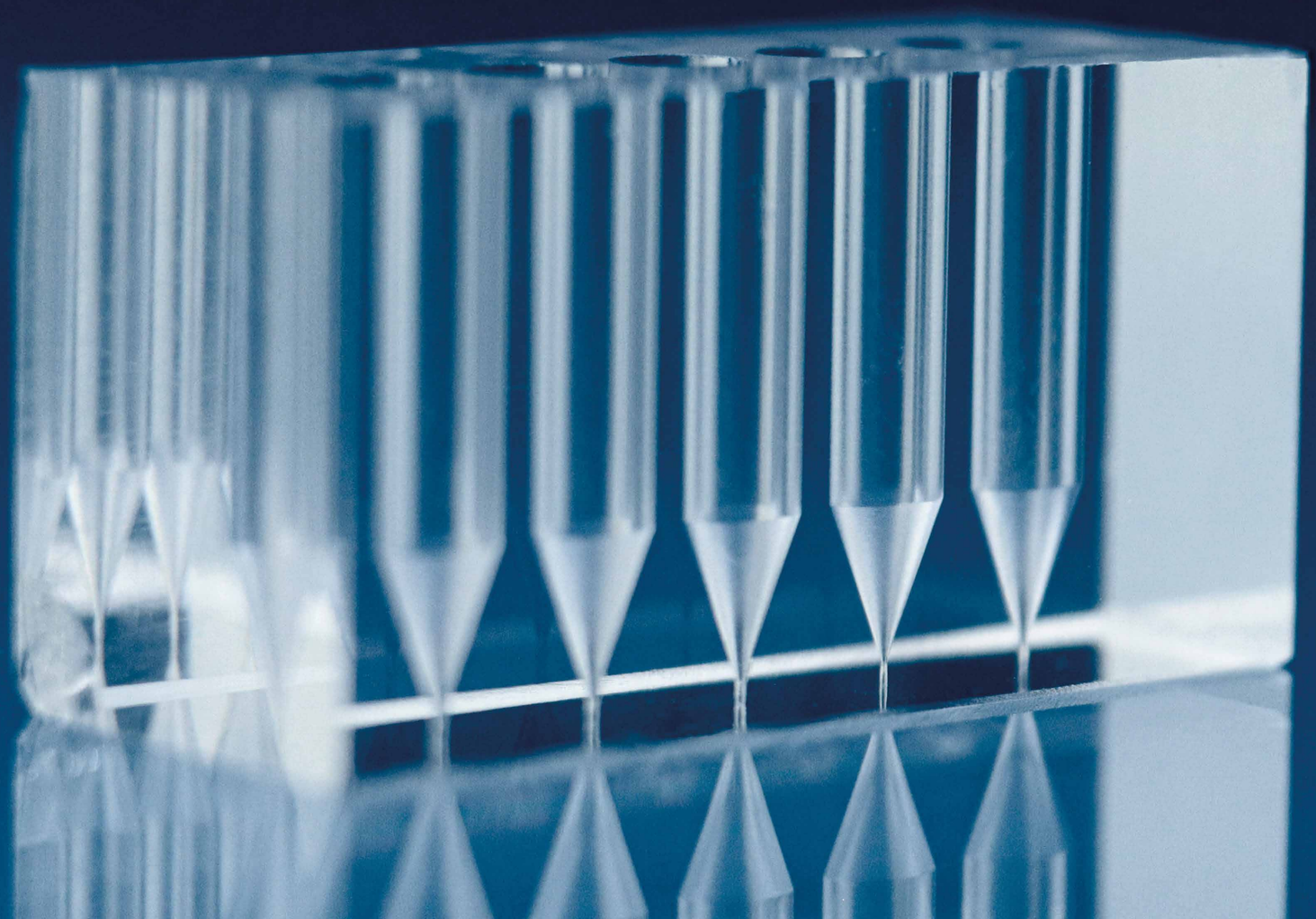
WOP

Optical Fiber Alignment Structures



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Technological achievements in optical fiber alignment arrays

The demand for fiber alignment structures has been growing in recent years, driven by the increasing demand for high-speed and reliable optical communications systems.

The most common application of optical fiber alignment structures includes optical communication systems to transmit data over long distances with high bandwidth and low latency.

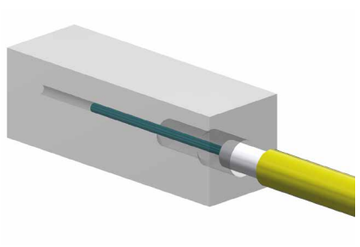
Optical fiber alignment arrays require precise alignment and positioning - the micro-holes formed in the optical fiber alignment array must be uniformly aligned and in a uniform pitch. The precision optical fiber alignment structures ensure that optical fibers are aligned accurately, providing reliable and consistent transfer of light and data.

WOP solution enables reaching excellent precision results in optical fiber alignment array fabrication – the crucial component in optical communication systems - resulting in low-loss, high-speed, large-capacity communication.

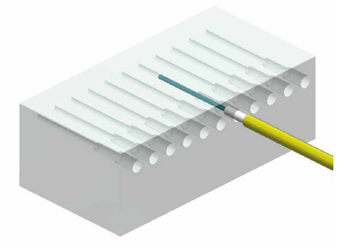
Laser technology for ultra-fast communication

While there are one-dimensional and two-dimensional (2D) arrays, the need for speed and growing data quantities increases demand for 2D arrays of optical fibers. They are versatile and flexible components used in diverse applications that require precise optical fiber alignment and positioning.

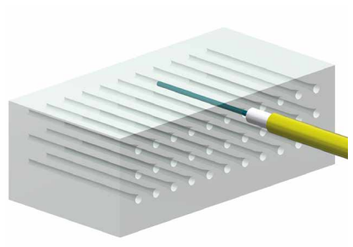
However, the production process of 2D optical fibers arrays is more complex vs. 1D, and while 2D arrays can be fabricated using diverse techniques, femtosecond laser micromachining, together with selective laser-induced etching (SLE), demonstrates definite advantages in precision, consistency, speed, material versatility, and cost-effectiveness.



One hole example with SMF fiber



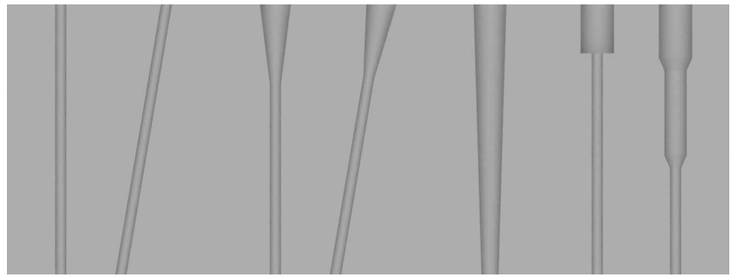
1D Alignment array with SMF fiber



2D Alignment array with SMF fiber

Using this laser micromachining method, critical features such as tight tolerances, tight positional accuracies, and hole diameter - within the tolerance of ±0.25 µm - can be achieved.

This tight control of metrics ensures well-controlled alignment that might reduce insertion loss and provide good repeatability.

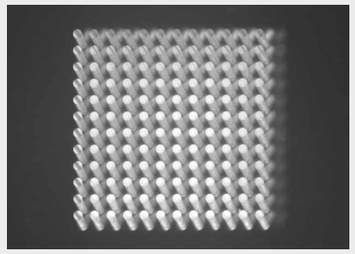


Examples of hole entrances and possible angles

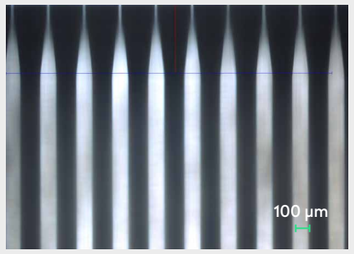
Moreover, this method enables forming the hole entrance as a funnel, step profile, or with a conical taper for easy fiber insertion. The channels can be straight or angled (like 8).

Even though it is designed for standard SMF fibers with a diameter of 125/250 µm, the laser micromachining with the SLE method is not limited to it - other diameters are also available (80 µm or less).

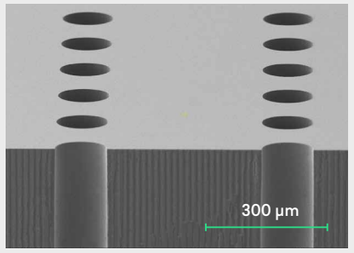
The other definite advantage is ultrafast direct laser writing speed, making this method suitable for high-scale production (WOP capacity is up to 10,000 precision fiber alignment units per month per laser machine).



144 channel fiber alignment plate



2D optical fibers arrays



2D optical fibers arrays

The advantages:

- Ultra-high precision & quality results
- Tight tolerances within ±0.25 µm
- Straight, flared, or with a cone for easier fiber insertion
- Designed for standard SMF fibers, diameter 125/250 µm (not limited)
- High density, standard 0,25 mm pitch
- Straight or angled holes
- Ultrafast direct laser writing speed, suitable for high-scale production