MicroAlign
Every fiber matters

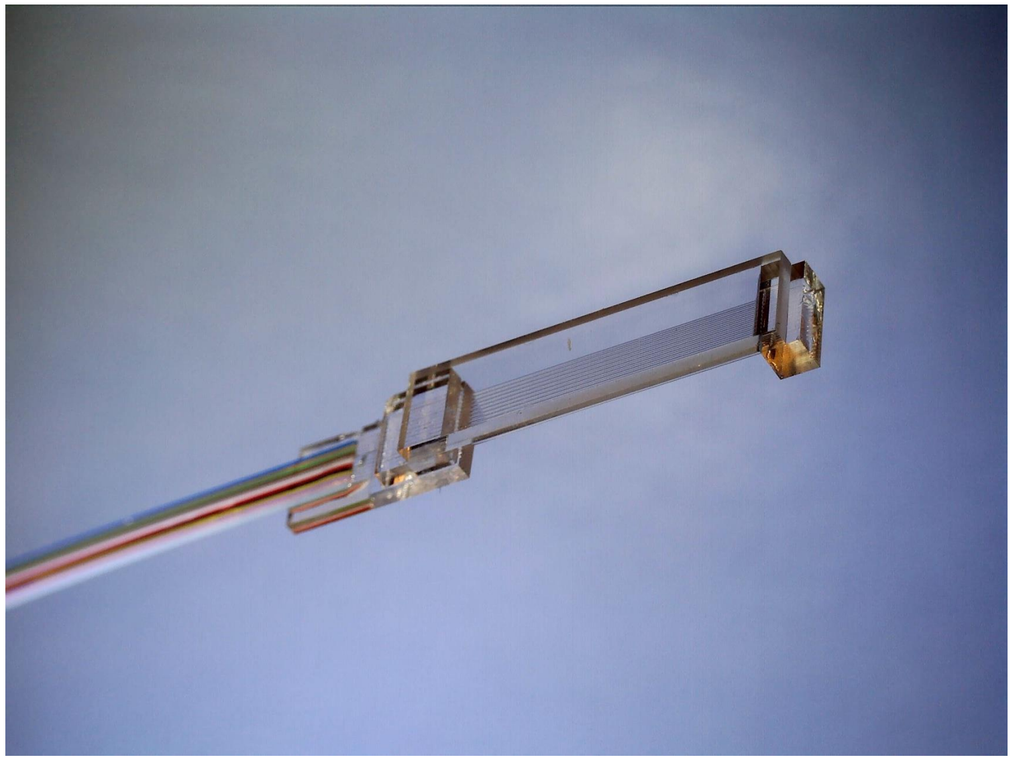
THE ULTIMATE FIBER ARRAY FOR PHOTONIC INNOVATION

<100 nm core positioning accuracy

Highest coupling efficiency for all fibers

New standard for fiber array connectivity

MicroAlign's ± 100 nm core position accuracy fiber arrays



MicroAlign’s technology aims to enhance the average coupling efficiency across all the channels of a fiber array, accommodating tens of densely spaced optical fibers. Utilizing a revolutionary micro-electromechanical system, each optical fiber is actively aligned during the fiber array manufacturing to ensure deep sub-micron core position accuracy. Our technology is unique worldwide as it is the only technique that enables simultaneous core-based alignment of each individual fiber in an array.

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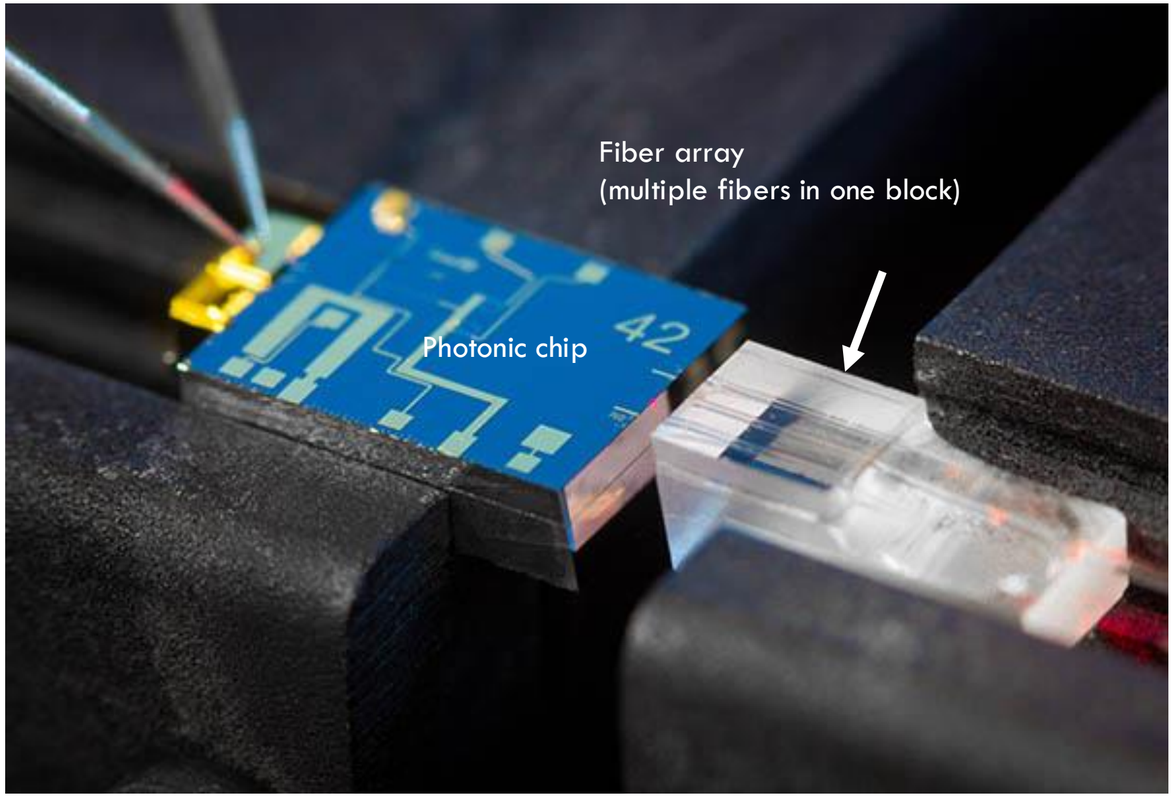
The problem in the photonic industry

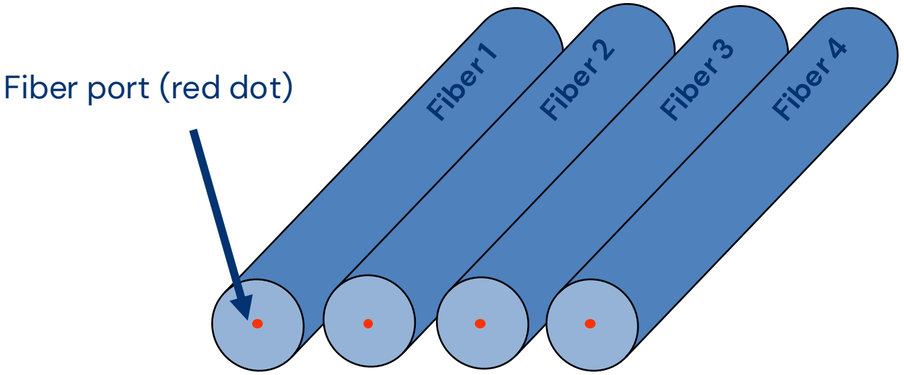
Optical fibers need to be positioned with << 1 µm accuracy for efficient connection with photonic chips.
This is not possible when the fibers are positioned together as a block, typically called “fiber array”.
The resulting problem is a loss of light between the fibers and the chip.



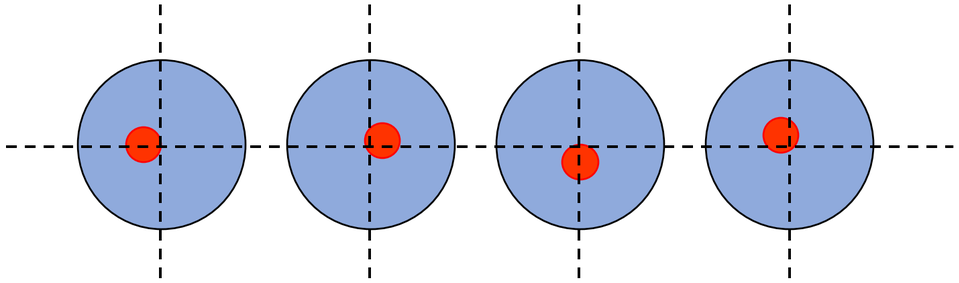
Source http://www.phix.com

Cause of the problem: the fabrication accuracy does not meet sub-micron alignment requirements

Fiber array schematic drawing. Light travels through the red ports



The fiber ports are **± 0.5 µm offset** from the ideal position (dashed grid nodes) → **5 % typical energy loss** when connected to a chip, in case of SMF28 fibers



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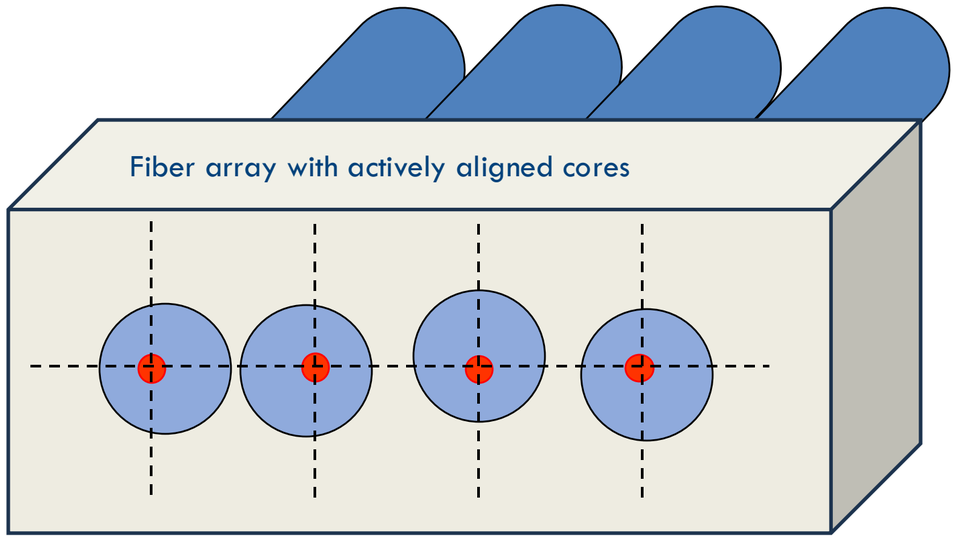
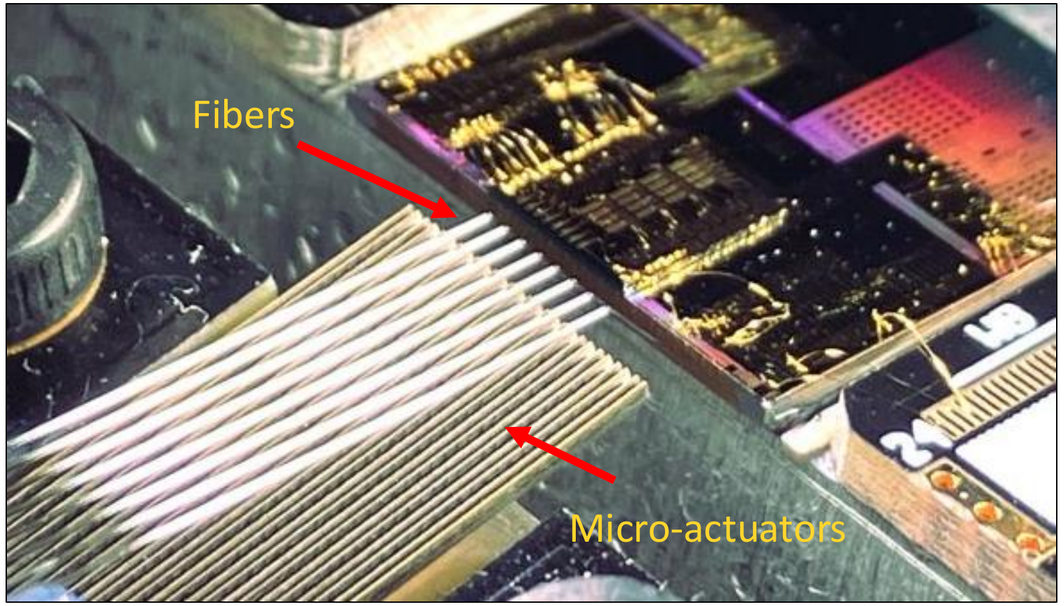
Solution: high accuracy fiber array

We are developing fiber arrays where the fiber cores are actively aligned within the array. Active alignment of the cores overcomes residual misalignment due to manufacturing imperfections.



Core technology based on micro-actuators that can independently and simultaneously align multiple fibers to a highly accurate reference optical device



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More beneficial consequences of our technology

Application: high-end fiber-to-chip coupling and free space coupling to a fiber array

Improved average coupling efficiency:	for small beam size (~ 3 µm) chip waveguides. Gain of up to 1-2 dB for large beam size (~ 10 µm) chip waveguides. Gain of up to 0.2-0.4 dB
Enhanced channel coupling uniformity:	Suppressed misalignment losses across fibers ensure consistent performance.
Scalable Design:	Potential to scale to tens of fibers with minimal impact on the average loss per fiber.
Improved optical sensing performance:	Higher coupling efficiency lowers the minimum detectable optical power, critical in sensing applications.
Ideal for single photon detection:	High-accuracy alignment minimizes optical losses, ensuring efficient photon capture. This precision is crucial for simultaneous detection of single photons across multiple fiber channels.

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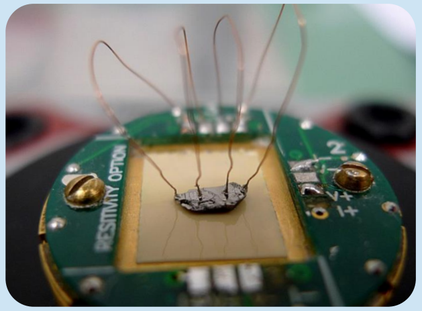
Benefits for a variety of applications

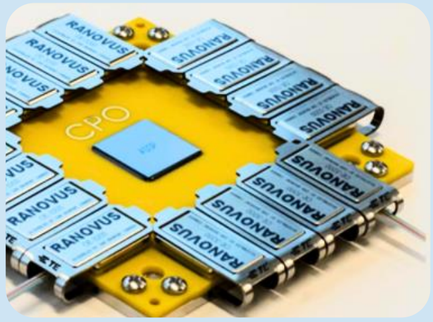
Quantum photonic computing

Every photon counts for applications working with single photons. As such, maximal coupling efficiency for each fiber to PIC coupling is required. Coupling efficiency is mainly determined by alignment accuracy and mode matching. Fiber arrays with perfect pitch allow for the lowest loss induced by misalignment.



Sensing

For analog optical signals, less difference in the per channel (and per product) optical coupling efficiency leads to more consistent performance and higher sensitivity. As such, the dynamic range will be more consistent between channels and products. The higher coupling efficiency lowers the minimum detectable optical power, thus enhancing the detection limit.



Communication

For digital signals, the optical coupling efficiency relates to energy consumption. Reduced coupling losses enable laser power reduction, enhanced optical operations and longer light transport distances.

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About MicroAlign

BACKROUND

FOUNDED YEAR: 2021

HQ: Eindhoven, The Netherlands

TECHNOLOGY: Unique fiber alignment technology

PRODUCT: High-accuracy FAU product

DRIVING FORCE

Cultural Diversity

Our multicultural team leverages global experience and insights, fueling creativity, adaptability, and cross-market collaboration.

Strong Engineering Core

We combine technical expertise with strategic business experience to deliver cutting-edge, practical, and commercially viable innovation.

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Get in-depth data, detailed graphs, and key features of MicroAlign technology.

www.microalign.nl

info@microalign.nl

Het Eeuwsel 57, 5612 AS, Eindhoven, NL