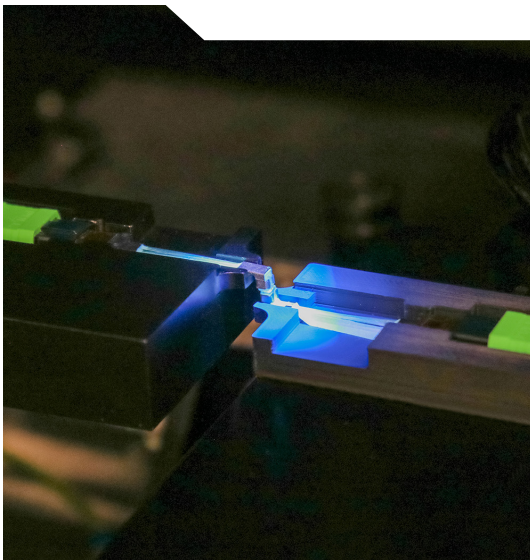


Active Alignment

— in Packaging and Interconnection Technology —



For demanding photonic and optoelectronic applications, **Tresky** provides high precision active alignment systems that ensure optimal optical performance and repeatability.

Our parallel-kinematic platforms enable simultaneous multi-axis motion with nanometer accuracy, allowing ultra fine adjustments in all spatial directions.

During the active alignment process, the position of fibers, chips, lenses, or laser diodes is continuously optimized in real time using optical feedback signals. This guarantees maximum coupling efficiency and stable, reproducible alignment results, essential for high-performance optical modules and advanced photonic integration.

Tresky's Supported Coupling Methods:

Edge Coupling

Direct light coupling into side-exposed waveguides with losses below 1 dB. Ideal for silicon photonics, laser modules, and high-speed optical interconnects.

Grating Coupling (Surface Coupling)

Vertical coupling via surface-structured gratings, a robust and process compatible solution for wafer-level testing and compact optoelectronic assemblies.

Lensed Fiber / Lens / Free-Space Coupling

Non-contact optical coupling for environments with strict cleanroom, vacuum, or long-term stability requirements — e.g., space applications, high-power lasers, and hybrid opto-mechanical systems.

Loop Coupling

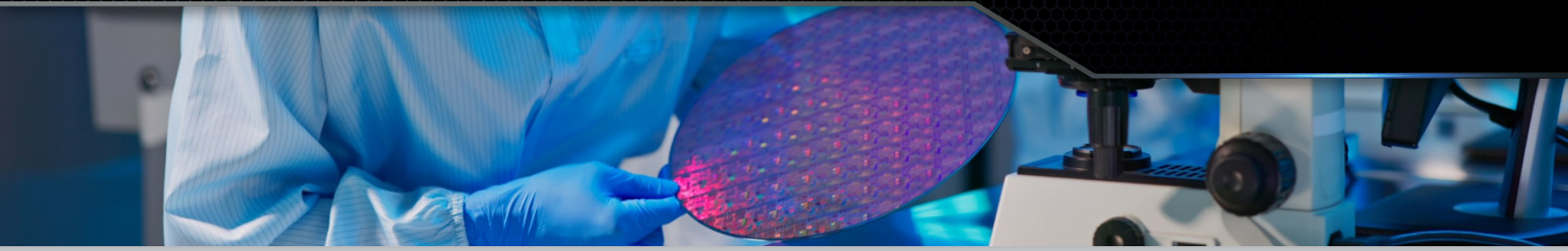
Used for signal control and distribution within integrated waveguide systems. Light is guided through microrings or microloops, enabling precise coupling between adjacent waveguides.

Fiber Coupling / Direct Coupling

Precise coupling of light from laser diodes or VCSELs directly into an optical fiber — without intermediate optics, ensuring minimal loss and high reproducibility.

Array Coupling

Simultaneous coupling of multiple light sources or waveguides with $<1\ \mu\text{m}$ positioning accuracy. Perfect for multi-channel photonic systems requiring high density and alignment stability.



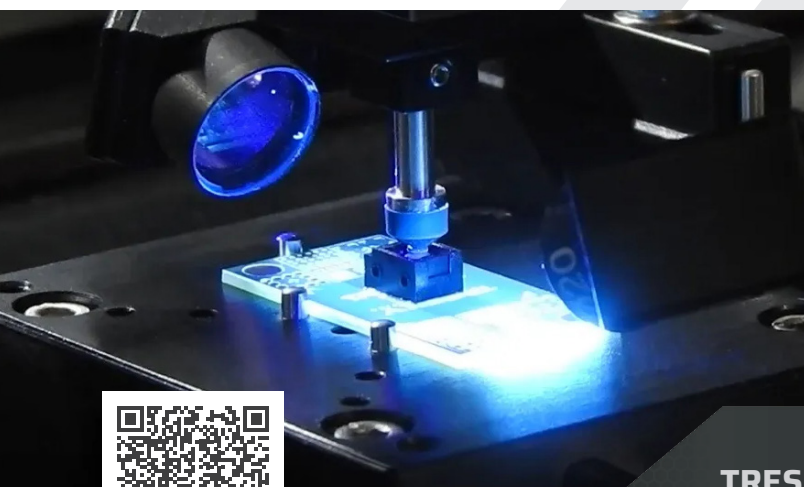
Active alignment is a key enabler of high-performance photonic assembly. Unlike passive alignment, which relies solely on geometric positioning, **active alignment** uses real-time signal feedback during assembly. This ensures not only precise placement of components but also optimal optical performance and maximum coupling efficiency.

This level of precision is especially critical for single-mode fibers, silicon photonics, and hybrid modules with multiple optical interfaces or non-standard geometries, where even sub-micrometer deviations can cause significant losses.

Tresky's active alignment solutions combine nanometer accuracy with flexible assembly methods, supporting a wide range of coupling processes and component types. The result is highly reliable, reproducible, and efficient manufacturing, ready to meet the demands of cutting-edge optical systems.

Added Value

- Maximum Precision & Coupling Efficiency
- Higher Process Reliability & Reproducibility
- Compatibility with other DIE Bonding Processes
- Flexible Process Integration
- Faster Setup and Cycle Times
- Future-Proof Manufacturing



more information

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