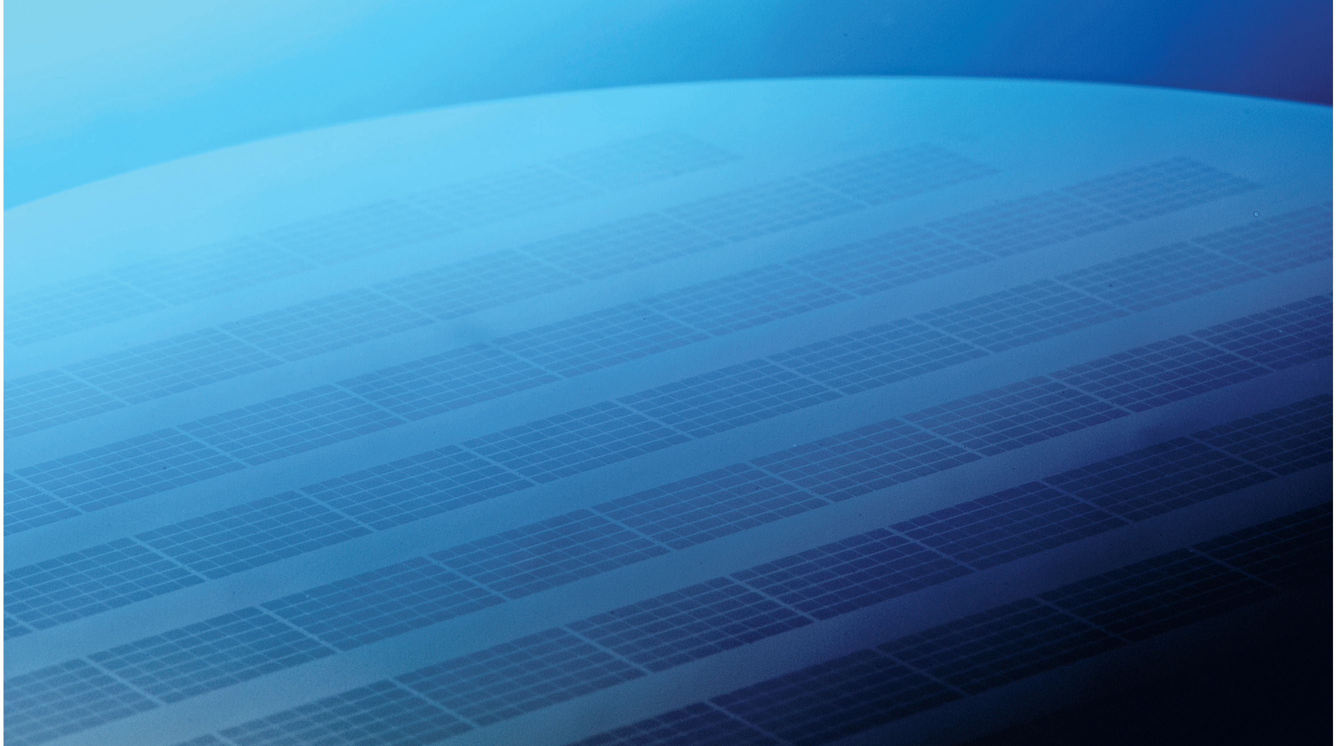

*Precise laser ablation for microelectronics components.*

# Precision laser processing for microelectronics

## Lasers for microelectronics

To meet the demands caused by its rapid growth, the microelectronics market requires new, flexible, ecological and cost-effective solutions for material processing and structuring. As the industry aims to produce in a green, environmentally friendly manner – to reduce or avoid chemical usage and lower the energy required to manufacture a chip – innovative, digital, laser-based manufacturing technologies are finding wider acceptance. Especially in PCB manufacturing, wafer dicing and packaging, as well as in the production of flexible photonic integrated circuits (PIC), laser-based manufacturing brings immediate benefits if the precision and quality of the processes meet the stringent requirements of this future industry.

## UV and DUV radiation as enablers

The high precision, flexibility and quality required of the components can only be achieved when the laser as well as the corresponding system technology are carefully selected. Excimer and solid-state UV as well as DUV lasers are used to achieve increased resolution and tailor-made surface properties of the generated structures. The short wavelengths enable high spatial resolution and efficient interaction with matter. Both mean the treatment is more located and efficient compared to visible or IR radiation, while the underlying layers and surrounding structures are impacted less severely.

## Damage-free processing due to customized laser system technology

With the high-power UV lasers available in the »UV Center of Excellence« recently established with the company Coherent, Fraunhofer ILT was able to demonstrate that different sub-µm structures can be fabricated with direct laser ablation. In addition, the flexibility of the laser-based approach enables the partners to process flat wafers and complex 3D surfaces where conventional mask-based lithography techniques reach their limits. The unique picosecond laser system with 266 nm wavelength makes it possible to generate structures with an edge roughness < 500 nm and paves the way for novel forward-looking laser delamination/transfer processes for fabricating microelectronic components.

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