

## TLS APPLICATIONS

- MICROELECTRONICS
- POWER DEVICES
- OPTICAL DEVICES
- SOLAR CELLS
- MEMS

## WHAT IS YOUR APPLICATION?

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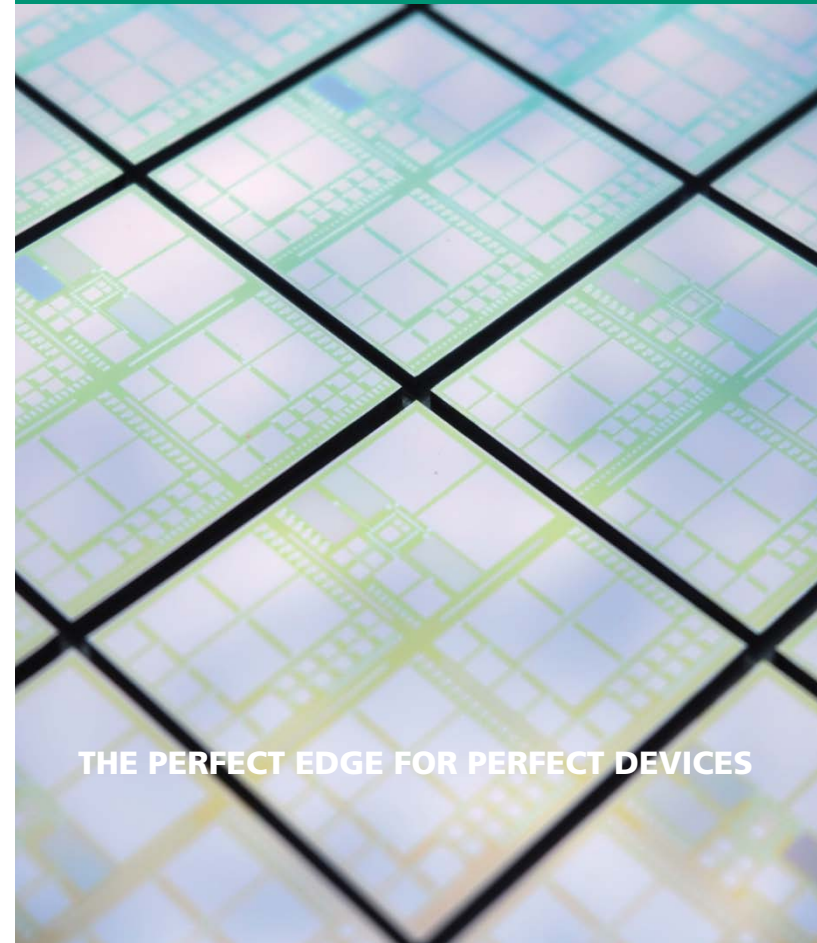
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Joint Development with

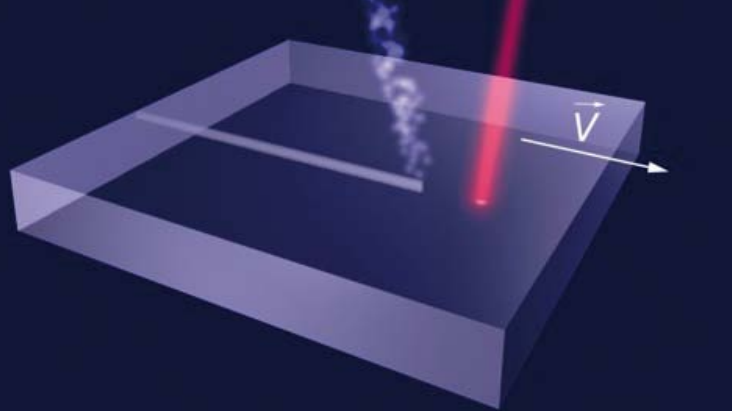


JENOPTIK Automatisierungstechnik GmbH

## THERMAL LASER SEPARATION (TLS)



THE PERFECT EDGE FOR PERFECT DEVICES



## PRINCIPLE OF TLS-DICING

Crack guiding by thermally induced mechanical stress.

Two-step process:

- 1. Crack initiation** with diamond tip or ablation laser; a predetermined cleaving point defines the TLS start.
- 2. Cleaving step** with laser heating and subsequent water cooling; high tensile stress inside the overlap zone between heating and cooling results in a complete cleaving of the substrate.

## TLS PROPERTIES & BENEFITS

### Zero kerf width

- More chips per wafer

### High edge quality

- No chipping
- High bending strength

### No recast, no residues

- No subsequent cleaning

### High feed rates

- High throughput

**Materials** under investigation:  
Si, SiC, mc-Si, Ge, GaAs, GaSb

## EXCEPTIONAL QUALITY

### 1-pass dicing of Si-wafers

- Successfully tested up to 925  $\mu\text{m}$  thickness

### Fast resizing of Si-wafers

- Bare and processed Si-wafers, e.g., 450 mm to 300 mm
- Process time below 1 min

### High-speed and high-quality dicing of 4H-SiC

- Feed rates up to 200 mm / s
- No chipping