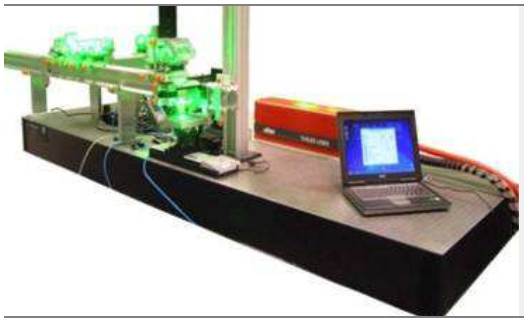
Green Line Laser Annealing

for Thin-Film Crystallisation



General Description: **| Advanced Optical Solutions |**

LIMO‘s green line laser for annealing is a diode pumped solid state laser technology. It has an ultra-narrow line-shaped light focus (8 µm) for optimal SLS (Sequential Lateral Solidification).

Advantages

Rapid and economical processing by using a diode pumped solid state laser

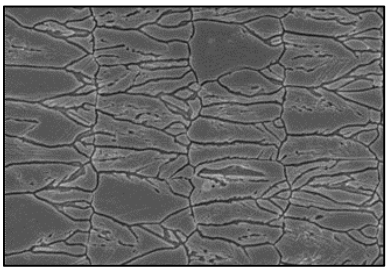
- Ultimate high homogeneity
- Large and homogeneous crystallites after SLS process
- Very high availability due to the rare maintenance and high reliability of DPSSL
- Small system footprint due to micro-optics beam shaping and DPSSL-technology
- Low initial costs / operation costs
- Much lower maintenance costs compared to ELA-Process
- Higher system availability > 95% compared to 75% for ELA-Process

LIMO’s unique M²-tuning beam-line shaping system

- Anisotropic quality transformation of multi-mode laser beam
- Enables to produce the long axis with high homogeneity
- Tight focus and large depth of focus
- Long working distance

Applications

Example:



- Polycrystalline silicon
- Laser Nd:YAG; SHG @ 532 nm, 90 W, 10 kHz, 45 ns-pulses.

Process and quality improvement in a variety of industries

- Flat panel display production
- Driver annealing
- Semiconductor devices
- Thin-film solar cell production
- Sensor production

Processing of a broad range of materials including

- C-Si
- A-Si on glass
- TCO (ITO) on glass
- Semiconductor wafer (Si, GaAs)

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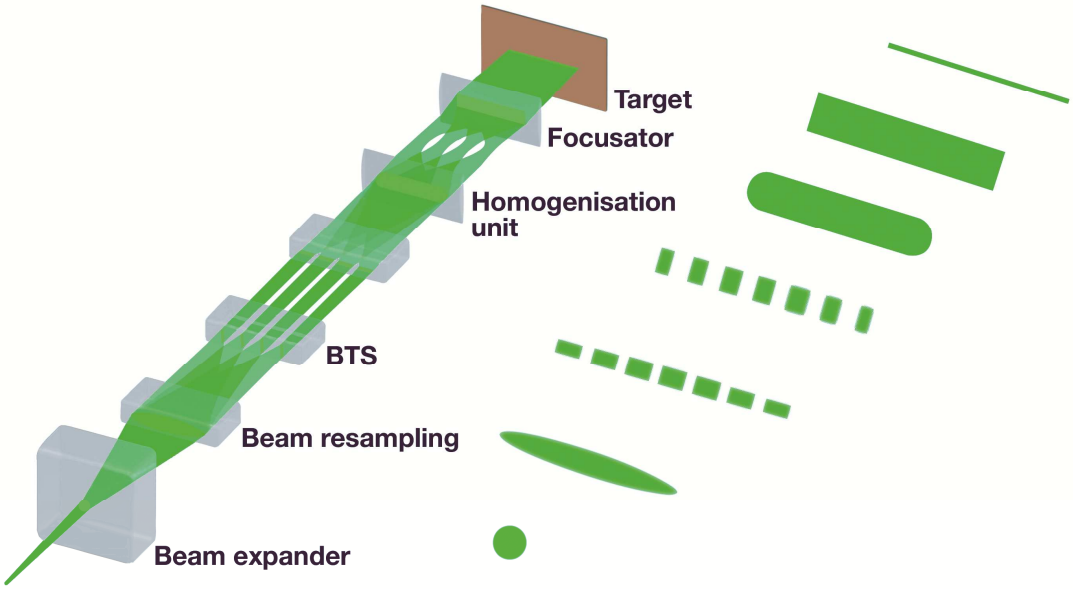
Technology

System performance	Unit	Specification
Field size at working distance (FW 95%)[1] - long axis top hat profile	mm	65
Field size at working distance (FWHM) - short axis Gaussian profile	µm	8
Inhomogeneity[2] (Imax-Imin)/(Imax+Imin)	%	≤ 2.5
Working distance	mm	60
DOF with 2% of max. intensity drop (@ FWHM = 8 µm)	µm	> 37
DOF with 5% of max. intensity drop (@ FWHM = 8 µm)	µm	> 60
Efficiency[3]	%	> 70
Optical length	mm	2490
Dimensions of the optical system	mm[3]	tbd[4]

[1] FW 95% of average intensity within 200 mm line length
[2] Integrated across active range of short axis, effective resolution long axis 250 µm, short axis 0.3 µm
[3] Total efficiency = ratio of the integrated power in the homogeneous field versus the total power at the field plane x transmission
[4] Custom configurations with multiple folding of the optical path



→ **The beam shaping optics can be matched to both second harmonic of Nd:YAG (532 nm) and Yb:YAG (515 nm) lasers with M^2 = 30 – 55, free beam or fibre delivery.**

Note: The laser source is not included. An industrial version (incl. housing) is available on request.

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