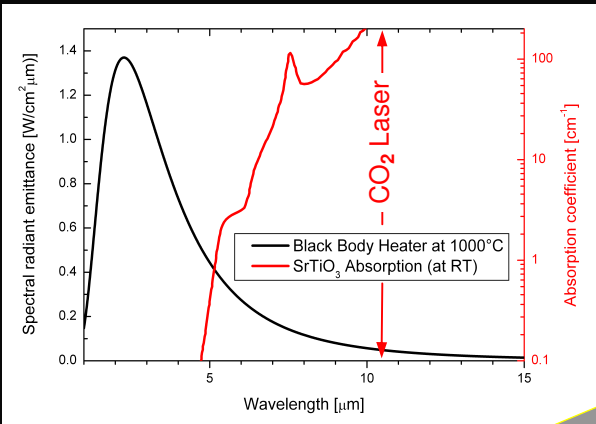
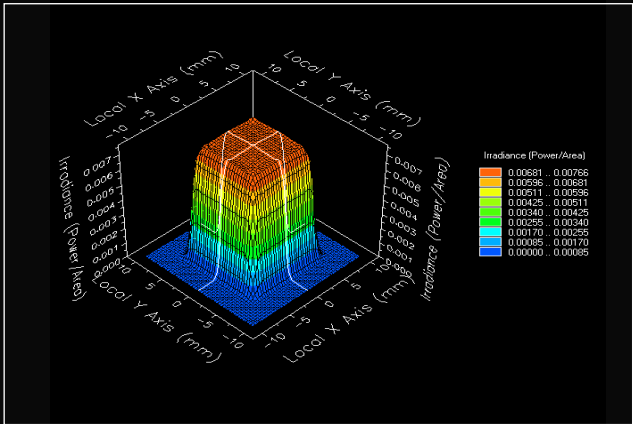


900°C
1000°C
500°C
1200°C
1500°C

... the STO and Sapphire heater



SURFACE

always one step ahead

CO₂

Laser - Heater

CO₂ Laser – for all NIR transparent materials

Oxide single crystal substrates are commonly used for functional films. Most of them are not absorbing in the near infrared radiation (NIR), but in the far-IR above 5 - 8 μm . So they can't be heated successfully if directly radiated by a **diode laser**.

Some examples: **Al₂O₃(sapphire):** >5.5 μm,

MgO: >8 μm ,

TiO₂: **>6μm,**

SrTiO₃: >5 μm,

TbScO₃: >8 μm

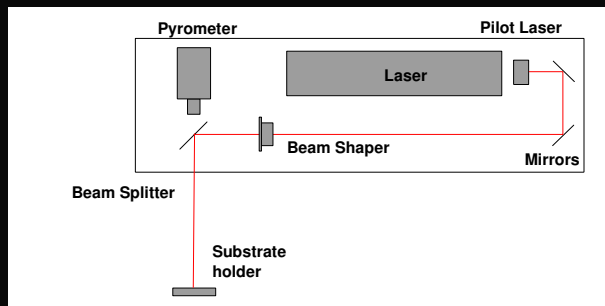
For all these materials the far IR radiation of a CO₂ LASER at 10,6μm is usable. Other materials of course show strong reflectivity at this wavelength, silicon is usable if the reflectivity is considered by design. Metals are not possible based on its mirror-like behavior. Therefore special SURFACE metal-ceramic sample carriers are used.

Beam line and beam shaping

Based on the Gaussian beam profile of the CO₂ laser beam, a careful beam shaping is essential for a uniform temperature profile at the substrate. SURFACE CO₂ laser heaters base on a well designed beam shaper to transfer the gaussian into a flat head.

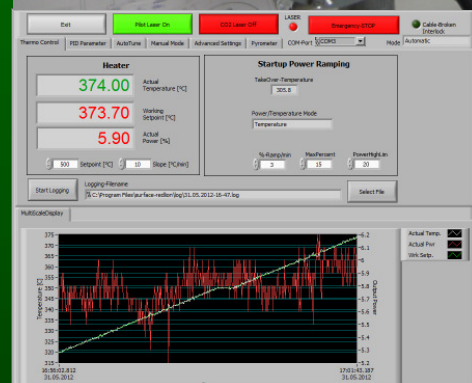
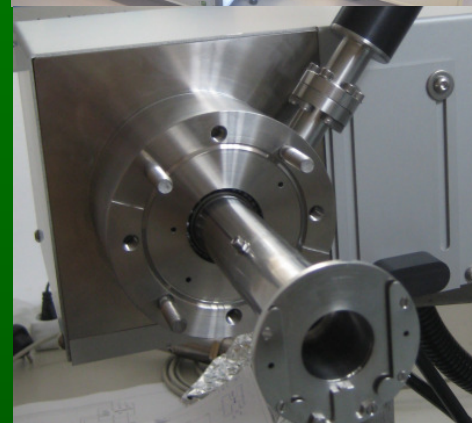
Beam line and substrate manipulator – one unit

Beam shaping always demands an accurate optical set-up. For that reason it is strongly recommended to integrate the substrate manipulator into the final beam line, especially if the substrate needs to be moved to modify the process conditions. Laser security precautions need to be recognized also for the final configuration.



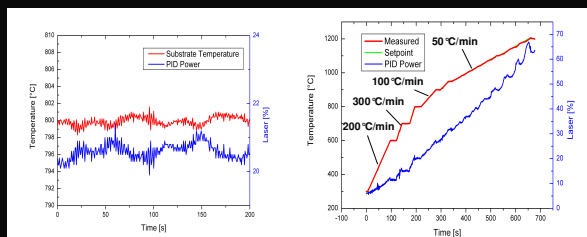
Therefore SURFACE strongly suggests to integrate the beam line directly into the substrate manipulator of a deposition system. The SURFACE typical coaxial beam set-up of laser and pyrometer beam allows a very compact configuration. The experiences of SURFACE in this field guarantee the best performances of such integration.

The laser is connected via an USB interface to the customers control system. An user friendly Labview interface allows a detailed process visualisation and includes datalogging and dataexporting.



Heating with CO2 laser

The flexibility of the CO₂ laser heating is demonstrated in the two graphs. The laser own power fluctuation of +/- 7% allows a thermal stability of approx. +/-1 °C. The laser typical heating dynamic depends only on the thermal conditions of the substrate. Very high temperatures above 1200 °C are possible.



Specifications:

Spot size: 10 x 10 mm
Max. Temp: depending on substrate

Laser:	CO ₂
Wavelength:	10,6 μm
Output power:	100,200 W
Beam shape:	flat head

Controller: built onto beam line
PC control: USB interface with
WIN7 driver
Labview interface
with datalogging

SURFACE

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