



- 1 Stochastic honeycomb structure.
- 2 Additive manufactured metal mirror with internal tailored lightweight structure.
- 3 Lightweight mirror on an ultra-precision turning machine.

## ADDITIVE MANUFACTURING OF OPTICAL HIGH-POWER COMPONENTS

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#### Motivation

Development of a technologically closed process chain for the production of opto-mechanical high-power metal components such as light-weight metal mirrors of aluminum-silicon for high-precise application, as well as reduction of overall manufacturing processes.

#### Characteristics

- Stability, lightweight design (60-75%)
- Reduced structure widths and wall thickness (200–500 µm)
- Reduced intrinsic stress
- Long-term stability
- Functional coatings (NiP, Cu) and surface coatings (Al, Ag, Au) for application in the VIS-NIR-UV spectral range
- Surface roughness < 1 nm RMS and form deviation < 150 nm PV (Ø 150 mm) after post finishing

#### Technology

- Selective Laser Melting (SLM)
- Powder bed process
- Exposure to conventional cw-laser or to short and ultra-short laser pulses (UKPL)
- Customized composition of the raw material AlSixx
- Heat treatment
- Surface refinement and post finishing

#### Advantages

Advantages over conventional techniques like drilling or milling are:

- Flexible production of components directly out of 3D-CAD data
- High freedom of design
- Integration of functions