Spatial Light Modulator for multi-hundred Watt Laser Materials Surface Processing

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As industrial laser technologies continue to develop to multi-hundred Watt (ultra-fast, ns) and kW levels (pulsed, CW) the optical components used in beam delivery also require superior performance when exposed to such extreme peak and average intensities. Beam shaping of a Gaussian beam is often desired to optimise the laser-material interactions, improving surface modification or texturing and can be achieved holographically using liquid crystal-on-Silicon Spatial Light Modulators (SLMs). We present experimental results on testing of a new SLM device capable of high diffraction efficiency up to P = 700W average power. Beam shaping at > 300W exposure is demonstrated, employing a SM fibre laser source for materials processing on metals. The results are relevant to the fields of both subtractive and additive manufacturing.