

# INVESTIGATION OF THE THERMAL AND OPTICAL PERFORMANCE OF A SPATIAL LIGHT MODULATOR (SLM) WITH 220W OF PICOSECOND LASER EXPOSURE FOR MATERIALS PROCESSING APPLICATIONS

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The performance of a cooled SLM has been measured with laser powers  $P > 200\text{W}$  at  $1064\text{nm}$ . SLM chip temperature rose by only  $5^\circ\text{C}$  at  $220\text{W}$ , measured with a thermal imaging camera. Phase response approached  $2\pi$  radians with average power  $P = 140\text{W}$  while at  $200\text{W}$ , phase response reached just over  $\pi$  radians. Using this knowledge, efficient high speed, multi-beam picosecond laser surface ablation and patterning was demonstrated on polished metal surfaces with average power  $P \leq 250\text{W}$ .

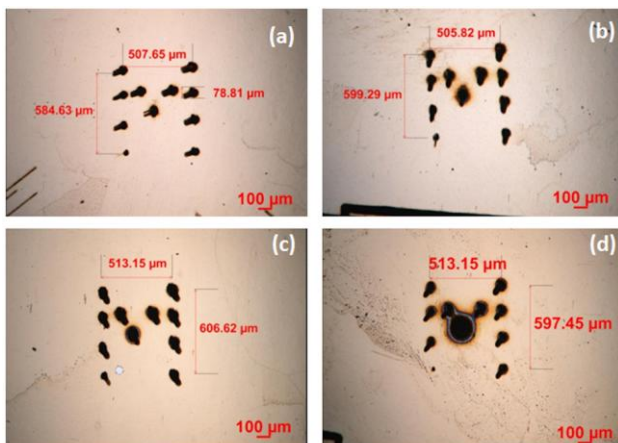


Figure 1. Optical images of surface patterning (letter "M") on polished brass plate with increasing laser powers, (a) 90W, 30ms, (b) 120W, 30ms, (c) 160W, 10ms, (d) 250W, 10ms. First order diffraction efficiency  $\sim 70\%$  up to 160W exposure while this reduced at 250W, consistent with reduced phase response.