

Meadowlark Optics Announces Ultra-High Power Spatial Light Modulator

leading the industry with a 1.4 kW damage threshold capability

FREDERICK, CO, UNITED STATES, April 8, 2025 /EINPresswire.com/ -- [Meadowlark Optics](#) has demonstrated a [liquid crystal on silicon \(LCoS\) spatial light modulator](#) (SLM) operating at a world-record average laser power of 1.4 kW.

In collaboration with Prof. Jeff Squier at Colorado School of Mines, and funded by a Phase I Department of Energy (DoE) Small Business Innovation Research (SBIR) grant, researchers at Meadowlark Optics built an LCoS SLM designed to withstand the heating effects of high-power lasers.

LCoS SLMs can shape light with high resolution (> 1 million analog pixels), but until now, LCoS SLMs have been limited to laser powers below 1 kilowatt. A [higher-power LCoS SLM](#) would have wide-ranging applications in research and industry. SLMs can shape laser beams used in welding and additive manufacturing of metal, allowing for parallelized processing to increase efficiency and to remove aberrations that would adversely affect quality. They can also split a single laser beam into an array of shaped beams for high-throughput surface treatment for aerospace, automotive, and medical device manufacturing – the higher power the SLM can handle, the greater the number of laser beams it can steer at once.

“There’s a lot of untapped potential for beamshaping in manufacturing, and the SLM we developed can help this be realized,” says Dr. Janelle Shane, principal investigator on the DoE SBIR grant.

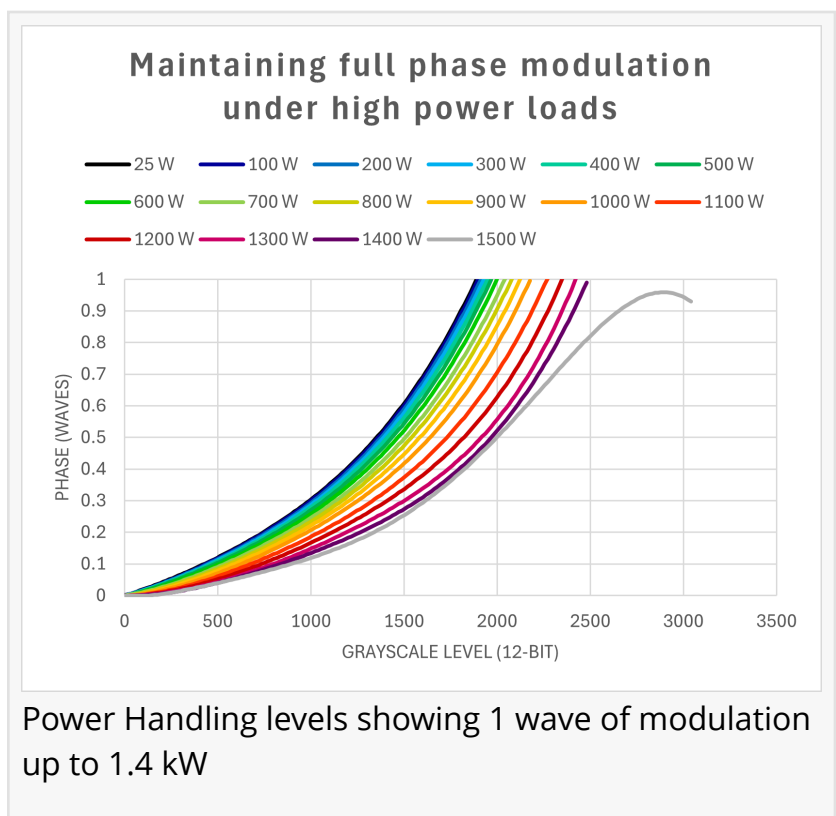
A primary challenge for withstanding high-power lasers is the heat produced by the laser as it bounces off the SLM’s surface. At high average powers, even a small percentage of laser



Ultra High Power SLM with Liquid Cooling up to 1.4 kW

absorption can result in a large heat load, which must be dumped into an external heat sink before it can build up to temperatures that would melt the liquid crystal. The SLM's materials are designed to minimize laser absorption and maximize heat transport away from the SLM.

Using the improved SLM, Meadowlark Optics tested the power handling at Spica Technologies, Inc. using a 2-kW continuous wave 1070-nm laser. The diffraction from the SLM was monitored as laser power was increased, showing that the system could repeatably be taken up to 1.4 kW before beginning to exhibit less than a full wave of phase modulation.



“We evaluated every material in the SLM,” says Mr. Connor Wolenski, a SLM Optical Development Engineer who worked on the project. “It’s been amazing to see the new design come together. This has been one of the most exciting projects I’ve worked on at Meadowlark Optics.”

About Meadowlark Optics:

Meadowlark has provided world-class liquid crystal solutions and polarization optics from a state-of-the-art manufacturing facility since 1998. To ensure precision and top quality, our 30,000 square foot headquarters boasts the latest in clean rooms, optical fabrication, metrology facilities and a breath-taking view of Colorado’s Front Range. For more information, visit www.meadowlark.com or call 303-833-4333.

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