

Description of Additional Supplementary Files

File name: Supplementary Movie 1

Description: Demonstration of precise intensity and grayscale control. A checkerboard pattern ($40 \times 40 \mu\text{m}^2$) is fabricated with a pitch of $2 \mu\text{m}$, where the graded structures are directly fabricated without compromising the speed ($\sim 5 \text{ mm/s}$; 22.7 kHz) and precision. The laser power at the high and low positions alternates between 16 mW and 8 mW repeatedly; the total write time is $\sim 1.1 \text{ s}$.

File name: Supplementary Movie 2

Description: Demonstration of multi-focus fabrication processes and results. One, two, three and four laser foci have been generated to parallelly write woodpile structures, respectively.