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Photo-Induced Typography with Vanadium Dioxide Thin Films SANCHARI SEN¹, MD NADIM FERDOUS HOQUE², LUIS GRAVE DE PERALTA³, ZHAOYANG FAN⁴, AYRTON BERNUSSI⁵, Texas Tech University — We report photo-induced insulator-metal phase transition studies of vanadium dioxide (VO_2) thin films to generate rewritable patterns in the NIR using a combination of pump-probe technique, a scanning mirror and an IR camera. The structures consisted of $VO_2 \sim 150$ nm thick films deposited on both sides of c-plane oriented sapphire substrates which temperature was controlled by a thermoelectric heater/cooler stage. Light from a CW high-power laser was deflected by the scanning mirror towards one of the sides of the sample to produce the desired patterns. An IR probe light source was used to illuminate the VO_2 samples and the images were obtained with an IR camera. The high power laser optically triggers the VO_2 insulator to metal phase transition and the scanned region becomes opaque to the IR irradiation. Clear and high contrast images with different shapes and sizes were demonstrated with the proposed technique. The characteristics of the generated patterns were controlled by the vibration amplitude of the scanning mirror. We anticipate that the developed approach can be prospectively used to realize reconfigurable Fresnel lenses, spatial light modulators, and optical equalizers operating in the NIR.

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