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In-situ Characterization of Laser-Induced Crystallization in Glass Using Raman Spectroscopy¹ BRIAN KNORR, PRADYUMNA GUPTA, ADAM STONE, HIMANSHU JAIN, VOLKMAR DIEROLF, Lehigh University — We report crystallization and other structural changes in glasses (such as LaBGeO₅) due to laser-induced localized heating. This heating process is a result of non-radiative decay after a photon absorption process. We explore linear absorption due to both band-to-band excitation or intentionally doped transition metal or rare earth ions using CW lasers as well as nonlinear absorption induced by high-intensity pulsed lasers. The ability to precisely position the laser on the μm length scale makes the crystallization interesting for photonic and optical applications such as waveguides and 3-D active functional devices. To better understand and control the crystallization process we are developing a combined CW laser-writing setup/confocal Raman microscope. This system will allow in-situ monitoring of the Raman emission during the crystallization. The data yielded will help elucidate the relationship between the phase, composition, and structure of the modified glass regions as a function of experimental variables, which include, but are not limited to, writing speed, irradiation time, heating rates, and defect concentration.

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