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Spectroscopic analysis of erbium doped laser-induced crystals for fiber-laser applications BRIAN KNORR, ADAM STONE, HIMANSHU JAIN, VOLKMAR DIEROLF, Lehigh University — Laser induced crystallization of glasses is a highly spatially selective process which could be used to produce crystalline-core optical fibers for fiber-laser applications. Toward this goal, single crystal lines were "written" in Er:$LaBGeO_5$ glass using a femtosecond pulsed laser. These structures were analyzed using micro-Raman and luminescence spectroscopy in order to determine their viability as waveguiding laser gain media. Two-dimensional scans reveal that the erbium fluorescence is inhomogeneous over the cross-section of the crystal and lacks spatial coordination with the Raman emission, implying a physical ion accumulation in addition to enhancement due to the crystal field. Additionally, erbium fluorescence spectra taken at low temperatures from polycrystals with varying concentrations of erbium were compared to those from the laser-induced crystal lines. Significant differences in the emission energies and intensity ratios of the erbium peaks were observed. These differences may be due to the presence of strain, grain boundaries, or charge resulting from the different crystallization processes used.

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