

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Structural and spectroscopic properties of rare earth doped crystal-in-glass waveguides as influenced by the initial glass composition
BRIAN KNORR, ADAM STONE, HIMANSHU JAIN, VOLKMAR DIEROLF, Lehigh University — Laser induced crystallization of glasses is a highly spatially selective process which has the potential to produce compact, integrated optics within a glass matrix. Specifically, our interest is in using this technique to create a laser. In order to achieve this goal, preliminary research was performed on single crystal lines “written” in $\text{Er}_{0.002}\text{La}_{0.998}\text{BGeO}_5$ glass using a femtosecond pulsed laser. This study revealed promising results including incorporation of the erbium into the crystal and the ability to waveguide with low losses, but also illuminated surprising features concerning the distribution of rare earth (RE) ions within the crystal. To further investigate this phenomenon and its potential consequences for our intended application, additional crystalline waveguides were written inside of a series of glasses with compositions of the form $\text{RE}_x\text{La}_{1-x}\text{BGeO}_5$, where RE=Pr, Nd, and Er and $x=0.002, 0.010, 0.040, 0.100,$ and 0.200 . These structures were analyzed using micro-Raman and luminescence spectroscopy as well as energy-dispersive x-ray spectroscopy.

Brian Knorr
Lehigh University

Date submitted: 15 Nov 2013

Electronic form version 1.4