Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Raman and Luminescence Investigation of Rare Earth Doped Laser-Induced Crystals-in-Glass BRIAN KNORR, Fairleigh Dickinson University, ADAM STONE, CEA Marcoule, 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. In $LaBGeO_5$ low temperature Combined Excitation Emission Spectroscopy (CEES) revealed that erbium incorporates into both glass-ceramics and laser-induced crystals-in-glass in predominantly one type of environment (site). The energy levels of this site were quantified. The fluorescence characteristics of the erbium ions in any site in the laser-induced crystals were found to be only weakly influenced by the irradiation conditions during growth. On the other hand, a hidden parameter, potentially boron deficiency-related defects, resulted in a significant change in the incorporation behavior of the erbium ions. Scanning confocal Raman and fluorescence spectroscopy showed that the energies of the Raman modes are shifted and the erbium fluorescence intensity is inhomgeneously distributed, despite the host glass being homogeneously doped, across the cross-sections of laser-induced crystals in glass. These fluctuations within the Raman and fluorescence are spatially correlated, implying that different erbium sites form preferentially at different locations in the crystal cross-section.

Brian Knorr
Fairleigh Dickinson Univ

Date submitted: 14 Nov 2014 Electronic form version 1.4