

Abstract Submitted  
for the SES06 Meeting of  
The American Physical Society

**Mid-infrared spectroscopy of Praseodymium doped Ternary Lead Halides** PETER AMEDZAKE, EI BROWN, UWE HOMMERICH, MORONKEJI BANDELE, Hampton University, SUDHIR TRIVEDI, Brimrose Corporation of America, JOHN ZAVADA, US Army Research Office — Solid-state lasers operating in the mid-infrared (MIR) wavelength ( $3\text{-}5\mu\text{m}$ ) region are important for applications such as remote sensing of biochemical agents and military countermeasures. Solid-state laser hosts based on oxide and fluoride crystals are limited by non-radiative decay through multi-phonon relaxation. Ternary lead halides have recently become of interest as new hosts for mid-infrared gain media because of their low maximum phonon energies ranging from  $140$  to  $205\text{ cm}^{-1}$ . The low-phonon energies allow for efficient rare earth emission at mid-infrared wavelengths. In this paper we report on the optical properties of several  $\text{Pr}^{3+}$  doped ternary lead halides including  $\text{KPb}_2\text{Cl}_5$ ,  $\text{RbPb}_2\text{Cl}_5$ ,  $\text{KPb}_2\text{Br}_5$ , and  $\text{RbPb}_2\text{Br}_5$ . The crystals were grown using a self-seeded Bridgman technique. Broad MIR emission spectra centered on  $\sim 4.6\mu\text{m}$  with a band width of  $\sim 0.9\mu\text{m}$  were observed upon optical excitation at  $1.907\mu\text{m}$ . Room temperature lifetimes varied between  $1.5\text{ ms}$  and  $5.0\text{ ms}$  depending on the host composition. More details of MIR emission properties and energy level assignments will be presented at the conference.

Ei Brown  
Hampton University

Date submitted: 08 Aug 2006

Electronic form version 1.4