Abstract Submitted
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Mid-infrared spectroscopy of Praseodymium doped KPb_2Br_5 and KPb_2Cl_5 PETER AMEDZAKE, EI NYEIN, UWE HOMMERICH, Hampton University, SUDHIR TRIVEDI, Brimrose Corporation of America, JOHN ZAVADA, US Army Research Office — Rare-earth doped low phonon energy hosts are promising materials for mid-infrared (MIR) solid-state laser applications. Room temperature laser activity has been demonstrated at 7.2 μm, 5.2 μm and 1.6 μm from Pr: $LaCl_3$. In this work, we report on the material preparation and optical properties of Pr doped KPb_2Br_5 (KPB) and KPb_2Cl_5 (KPC). KPB and KPC are both non-hygroscopic and have low maximum phonon energies of 140cm^{-1} and 200cm^{-1}, respectively. The small phonon energies lead to reduced non-radiative decay rates due to multiphonon relaxation. The preparation of Pr: KPB and Pr: KPC was based on a careful purification of the host materials followed by self-seeded Bridgman crystal growth. The characteristic absorption bands were obtained in the visible and IR spectral region. Under 1907 nm and 1550 nm excitations, both crystals exhibited broad MIR emission spectra centered $\sim$4.7 μm with a room-temperature lifetime of 4.5 ms. Results of temperature dependent and time-resolved emission spectroscopy of Pr: KPB and Pr: KPC will be presented at the conference.

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