

Abstract Submitted
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Growth and spectroscopic characterization of Ho-doped KPb_2Cl_5 crystal for mid-IR laser applications OLUSOLA OYEBOLA, EI BROWN, UWE HOMMERICH, Hampton University, SUDHIR TRIVEDI, Brimrose Corporation of America, ALTHEA BLUIETT, Elizabeth City State University, JOHN ZAVADA, North Carolina State University — Results of the crystal growth and infrared spectroscopy of Ho:KPb₂Cl₅ (KPC) are presented for possible applications in mid-infrared solid-state lasers. KPC was synthesized from high purity PbCl₂ and KCl materials and purified through horizontal zone-refinement. 1-3 wt% of HoCl₃ was mixed to the purified KPC and molten under a chlorinating atmosphere. Ho:KPC crystals were then grown using a self-seeded horizontal Bridgman technique. Absorption and emission studies were carried out on the polished crystal. Following optical excitation at 750 nm and 885 nm, several emission bands were observed in the near- and mid-IR spectral region. Further spectroscopic studies were focused on the mid-IR emission at 3900 nm arising from the Ho³⁺ transition $^5\text{I}_5 \rightarrow ^5\text{I}_6$. The room temperature emission lifetime of the $^5\text{I}_5$ level was measured to be 4.9 ms, which is in good agreement with the radiative lifetime determined from a Judd-Ofelt analysis. This result indicates that multi-phonon relaxation processes are not significant for the 3.9 μm emission from Ho: KPC. Further results of the infrared absorption and emission properties of Ho: KPC will be presented at the conference.

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