

4f₂ to 4f_{5d} excited state absorption in Pr³⁺-doped crystals

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Abstract

We first report one photon classical spectroscopy of Pr³⁺-doped LiLuF₄ single crystals which leads to the energy level diagram for Pr³⁺ levels in this host and to the 1D₂ and 3P₀ emitting level lifetimes. Then, excited state absorption (ESA) spectra from these metastable levels to 4f_{5d} states are presented and the ESA cross-sections are in the order of 10-18 cm². Subsequently, such upconversion excitation into the 4f_{5d} states of Pr³⁺ is used to generate the broad band 4f_{5d} to 4f₂ UV fluorescence. Moreover, an energy transfer from Pr³⁺ 4f_{5d} states to Ce³⁺ 5d states is clearly identified.

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