

Energy transfer and upconversion of Nd³⁺ doped RbY₂Cl₇.

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Streszczenie

Single crystals of Nd³⁺:RbY₂Cl₇ were grown by the Bridgman–Stockbarger method. The host crystal contains two slightly inequivalent Y³⁺ ions, each with an approximate C_{2v} site symmetry. Anti-Stokes emission from the ⁴G_{7/2} and ⁴D_{3/2} levels was observed after laser excitation of the ⁴F_{3/2} and ⁴F_{9/2} multiplets. Laser excitation at 413 cm⁻¹ or 453 cm⁻¹ above the ⁴F_{3/2} multiplet resulted in emission from the ²P_{1/2} level. Laser site-selective upconverted emission spectra have been measured, as well as their emission transients and power dependence. Possible excited state absorption and energy-transfer upconversion (ETU) mechanisms are proposed and discussed. Due to the smaller crystal field and a somewhat different energy level structure for the Nd³⁺ ions in RbY₂Cl₇ as compared with those observed for Nd³⁺ in fluoride or oxide hosts, the ⁴G_{7/2} and ⁴D_{3/2} multiplets are populated under ⁴F_{3/2} excitation in a three and four step ETU process, respectively, instead of in a two and three step process as observed for the lighter hosts.

Słowa kluczowe

RbY₂Cl₇:Nd³⁺, Upconversion, Laser selective excitation and emission, Excited state absorption, Energy transfer

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