

Examples of Nd³⁺ spectroscopy : the 4f³ intra-configurational transitions in Lu₂O₃ ceramics for laser source and the 4f²5d-4f³ inter-configurational transitions in 20Al(PO₃)₃-80LiF glass as potential neutron scintillator.

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The main objective of this communication is to report two examples of Nd³⁺ ion spectroscopy in different types of solids.

First, Nd³⁺-doped Lu₂O₃ laser ceramics, of high thermal conductivity, fabricated by the non-conventional Spark Plasma Sintering (SPS) technique in which the 4f³ intra-configurational transitions of both C₂ and C_{3i} sites and of C₂-C_{3i} and C₂-C₂ Nd³⁺ pairs have especially been analyzed, as well as the first feasibility of the laser oscillation inside the main C₂ site showing two close ⁴F_{3/2} → ⁴I_{11/2} lines at 1076.3 and 1080.5 nm, respectively [1-3].

Secondly, the different inter-configurational 4f²5d and intra-configurational 4f³ transitions of Nd³⁺-doped 20Al(PO₃)₃-80LiF (APLF) glass. The most important property of this glass is that they exhibit electric-dipole allowed 4f²5d → 4f³ (⁴I_{9/2}) broadband emission around 187 nm (VUV) with decay times of ~ 5.0 ns [4]. Since these decay times are faster than known Pr³⁺ [5] and Ce³⁺-doped APLF glasses [6], the Nd³⁺-doped APLF glass can be ranked as one of the advanced potential scintillator materials to detect neutrons.

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