Properties of ytterbium and neodymium doped alkali metal yttrium double phosphates of the $M_3Y_{1-x}Ln_x(PO_4)_2$ type.

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The spectroscopic behaviour of the Nd^{3+} and Yb^{3+} doped alkaline metal yttrium double phosphates, $M_3Y_{1-x}Ln_x(PO_4)_2$ (M=Na, Rb; x=0.01–0.3) were studied for both powder and single crystal samples. The high resolution absorption and emission spectra were measured in the visible and IR regions. Spectral changes with the Nd^{3+} and Yb^{3+} concentration were interpreted. The absorption strengths of the 4f–4f transitions were analysed and used to assess the structural modifications of the two double phosphates. Based on the 4 K absorption spectra the number of metal sites occupied by the dopants was investigated. Strong emission from $Na_3Y_{1-x}Nd_x(PO_4)_2$ involving the transitions were observed whereas the corresponding emission from the rubidium phosphate was presumably quenched by multiphonon processes due to the water molecules absorbed in the channel-like structure. The IR spectra were used to assign the vibronic components of the electronic transitions. The Yb^{3+} emission bands were broadened depending on the Yb^{3+} concentration (1–10 mol%). The tentative energy level scheme of the ground and excited 2FJ (J=7/2, 5/2) levels was described.

Słowa kluczowe

Neodymium, Ytterbium, Absorption, Emission, Yttrium double phosphates

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