

Charge transfer and f-f emission of trivalent ytterbium observed in double phosphates $M^I M^{III}(\text{PO}_4)_2$ ($M^I = \text{Na, Rb}$; $M^{III} = \text{Lu, Y}$).

Autorzy

Janina Legendziewicz

Małgorzata Guzik

W. Szuszkiewicz

Rok wydania

2008

Czasopismo

Journal of Alloys and
Compounds

Numer woluminu

451

Strony

165-171

DOI

10.1016/j.jallcom.2007.04.128

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Spectroscopic properties of Yb^{3+} -doped $M^I_3M^{III}(\text{PO}_4)_2$ and ($M^I = \text{an alkali metal: Na, Rb}$; $M^{III} = \text{trivalent cation Lu or Y}$) are reported. In order to study their optical characteristics, the absorption, emission and luminescence excitation spectra have been measured at 4, 10 and 293 K in the VUV to IR range. Systematic comparison of the absorption spectra, intensity of the f-f transitions and emission efficiency of ytterbium in all the types of the investigated compounds have been made. Luminescence of the samples has been excited using various excitation lines, including the synchrotron radiation. Strong fundamental $^2F_{5/2} \rightarrow ^2F_{7/2}$ emission in the IR range has been observed. The double peak spectrum typical for the Yb^{3+} charge transfer (CT) luminescence has been recorded after synchrotron radiation excitation only in the sodium compounds. The possible process of the CT emission quenching in rubidium ytterbium double phosphates is considered. Possible mechanism of the energy transfer to the Yb^{3+} 4f states is discussed. Detailed analysis of the spectra of Yb^{3+} -doped sodium and rubidium lutetium double phosphates has been performed to determine the energy levels in these hosts and to compare their optical behaviour with analogous sodium and rubidium yttrium double phosphates. The IR spectra have been used to assign the electronic and vibronic components. The tentative energy level scheme of the $^2F_{7/2}$ ground and $^2F_{5/2}$ excited levels is proposed.

Słowa kluczowe

Charge transfer emission, Yb-doped double phosphates

Adres publiczny

<https://doi.org/10.1016/j.jallcom.2007.04.128>

Strona internetowa wydawcy

<http://www.elsevier.com>

Plik został wygenerowany dnia 2026-08-20 09:10:15

Adres w repozytorium <https://old.chem.uni.wroc.pl/pl/repozytorium/C6PKRyq>.