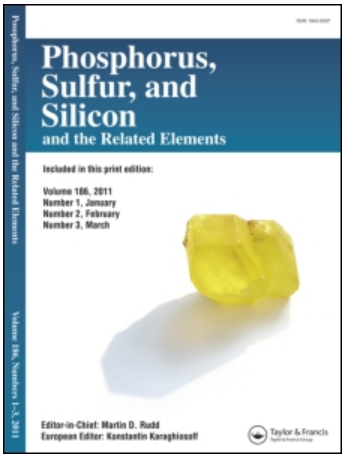

Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

Spectral-Structural Regularities of Rare-Earth Phosphates

V. P. Orlovskii[a]; E. N. Muravyev[a]; N. N. Morozov[b]; V. G. Kara-butov[b]; G. E. Sukhnova[b]; T. P. Loschenova[b]; N. A. Klardgeshvili[b]

[a] N.S. Kurnakov Institute of General and Inorganic Chemistry, Academy of Sciences of the USSR, Moscow, USSR [b] Branch Research Laboratory, Institute of General Physics, Academy of Sciences of the USSR, Andigan, USSR

To cite this Article Orlovskii, V. P. , Muravyev, E. N. , Morozov, N. N. , Kara-butov, V. G. , Sukhnova, G. E. , Loschenova, T. P. and Klardgeshvili, N. A.(1990) 'Spectral-Structural Regularities of Rare-Earth Phosphates', Phosphorus, Sulfur, and Silicon and the Related Elements, 51: 1, 448

To link to this Article: DOI: 10.1080/10426509008040972

URL: http://dx.doi.org/10.1080/10426509008040972

Phosphorus, Sulfur, and Silicon, 1990, Vols. 51/52, p. 448
Reprints available directly from the publisher
Photocopying permitted by license only

SPECTRAL-STRUCTURAL REGULARITIES OF RARE-EARTH PHOSPHATES

V.P.ORLOVSKII, E.N.MURAVYEV, N.N.MOROZOV[a], V.G.KARABUTOV[a], G.E.SUKHANOVA[a], T.P.LOSCHENOVA[a], and N.A.KLARDGESHVILI[a]
N.S.Kurnakov Institute of General and Inorganic Chemistry, Academy of Sciences of the USSR, Leninskii pr. 31, Moscow 117907, USSR
[a]Branch Research Laboratory, Institute of General Physics, Academy of Sciences of the USSR, Freedom pr. 38, Andigan 710000, USSR

The results of spectral and structural studies of thulium and lutecium ortophosphates doped with rare-earth Ln^{3+} ions (Ln=Ce, Nd, Eu, Tb, Er) are presented. The compounds have been synthesized by chemical transport method. Luminescence and absorption spectra in visible and IR-spectrum ranges are obtained at 77 and 300K. Studies of characteristic optical transitions of Ln^{3+} ions enabled to identify their Stark sublevels and calculate crystalline field parameters. Vibrational spectroscopy data are used for the analysis of luminescence features of rare-earth ions in the orthophosphate matrix. Raman and middle IR-absorption spectra are investigated at room temperature. IR Fourier transform spectrograms are obtained at 5K. By X-ray diffraction isomorphic substitution of the lattice cations with other Ln^{3+} ions (up to 5-10 mol%) has been found to result in the formation of solid solutions based on tetragonal modification of $TmPO_4$ type. With further increase of the active ion concentration, the material transforms into the two-phase mixture. The combination of the spectroscopic methods enables to analyse in detail the variations of crystal lattice and phosphorus-oxygen-ligand crystalline field parameters as transition from single-phase solid solutions to two-phase mixtures of rare-earth orthophosphates.