

X-ray diffraction study of structure of rare-earth orthovanadate nanoparticles doped with calcium

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Optical materials based on rare earth vanadates (REVO₄) are widely used in science and technology because they are characterized by high absorption in a wide spectral range and effective energy transfer from vanadate host to the RE ions. Such compounds are used as luminescent light emitting materials and luminescent spectral converters. At the last years, nanosized orthovanadates have also attracted considerable research interest as perspective photocatalyst systems for water splitting. All the above mentioned applications require vanadate materials with high efficiency of excitation under light from near UV and violet spectral ranges. In this study, we investigate the structural properties of La_{1-x-y}Er_y/2Eu_y/2Ca_xVO₄ where x=0.1, y=0.1; x=0.2, y=0.15, at room temperature. Samples were prepared by aqueous nitrate-citrate sol-gel method. Powder diffraction measurements were performed at P02.1 PETRA III Beamline in DESY using a beam with 0.0207 nm wavelength. Phase analysis of La_{0.8}Er_{0.05}Eu_{0.05}Ca_{0.1}VO₄ and La_{0.65}Er_{0.1}Eu_{0.1}Ca_{0.15}VO₄ has shown that samples crystallize in two different structure, monoclinic and tetragonal. The starting model for refinement of La_{0.8}Er_{0.05}Eu_{0.05}Ca_{0.1}VO₄ is LaVO₄ with Monazite type and La_{0.65}Er_{0.1}Eu_{0.1}Ca_{0.15}VO₄ is LaVO₄ with Zircon type structure. The proportion of the monoclinic to tetragonal phases is depend on amount of dopant. The structures of component phase are refined.

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Topics

Session A. Physics of condensed matter and spectroscopy

Primary authors: Ms RAHIMI MOSAFER, houri sadat (Institute of Physics, Polish Academy of Sciences); Prof. PASZKOWICZ, W. (Institute of Physics, Polish Academy of Sciences); Dr CHUKOVA, O. (Faculty of Physics, Taras Shevchenko National University of Kyiv); NEDILKO, S.G. (Faculty of Physics, Taras Shevchenko National University of Kyiv); NEDILKO, S.A. (Faculty of Chemistry, Taras Shevchenko National University of Kyiv); VOITENKO, T. (Faculty of Chemistry, Taras Shevchenko National University of Kyiv)

Presenter: Ms RAHIMI MOSAFER, houri sadat (Institute of Physics, Polish Academy of Sciences)

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