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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 La1-x-yEry/2Euy/2CaxVO4 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 La0.8Er0.05Eu0.05Ca0.1VO4 and La0.65Er0.1Eu0.1Ca0.15VO4 has shown that samples crystalize in two different structure, monoclinic and tetragonal. The starting model for refinement of La0.8Er0.05Eu0.05Ca0.1VO4 is LaVO4 with Monazite type and La0.65Er0.1Eu0.1Ca0.15VO4 is LaVO4 with Zircon type structure. The proportion of the monoclinc 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

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