UP-CONVERSION LUMINOPHORES BASED ON CALCIUM FLUORIDE, STRONTIUM FLUORIDE, BARIUM FLUORIDE AND LEAD FLUORIDE DOPED WITH YTTERBIUM AND ERBIUM/THULIUM/HOLMIUM

S.V. Kuznetsov, V.A. Konyushkin, A.N. Nakladov, A.A. Alexandrov

Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia.
kouznetzovsv@gmail.com

Up-conversion fluoride luminophores have great interest for increasing efficiency of solar cells, anti-counterfeiting, thermometry and biophotonics. The implementation of up-conversion nanoluminophores for practical application requires estimation of the luminescence efficiency of nanoparticles with different morphology and core-shell architecture. Measurements of absolute photoluminescence quantum yield in an integrating sphere (A-PLQY) for dispersions or particles are very difficult. One of the solutions is the determination of relative photoluminescence quantum yield (R-PLQY) without an integrating sphere using luminescence standard. The ideal object for the luminescence standard is a single crystal that has a maximum volume to surface ratio.

The goal of the study is the determination of single crystal composition with the highest A-PLQY and its examination as the standard of up-conversion luminescence.

The MF_2:Yb:R (M=Ca, Sr, Ba, Pb; R = Tm, Ho, Er) single crystals were grown by the Bridgman technique in a vacuum furnace with CF_4 fluorinating atmosphere. The different nanoparticles were synthesized by the solvothermal technique.

The compositions with highest value of up-conversion quantum yields were determined. These single crystals were successfully testified as reference materials.

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