

EFFICIENT UPCONVERSION LUMINESCENCE IN Er³⁺ DOPED NaYF₄: TRANSPARENT OXYFLURIDE GLASS CERAMICS AND MICROCRYSTALS

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In this work transparent erbium doped oxyfluoride glass ceramics containing hexagonal NaYF₄ nanocrystals has been prepared by melt-quenching and subsequent heat treatment of the precursor glass. The formation of β -NaYF₄ was confirmed by X-ray diffraction measurements and transmission electron microscopy analysis. The average diameter of the nanocrystals was in the order of 50 nm.

Excitation in the infrared leads to a strong visible luminescence signal observed in the region of 520 nm–550 nm ($^4S_{3/2}, ^2H_{11/2} \rightarrow ^4I_{15/2}$). The overall intensity of the upconversion luminescence of the glass ceramics sample is 2 orders of magnitude higher than that of the precursor glass. The observed enhancement of efficiency is explained by the incorporation of Er³⁺ into low-phonon β -NaYF₄ crystalline phase.

The comparison of upconversion luminescence in the transparent oxyfluoride glass ceramics and highly efficient β -NaYF₄:Er³⁺ microcrystals suggests an efficient Er³⁺ doping of the nanocrystals in the glass.

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