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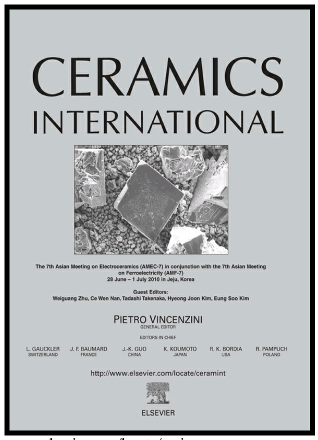

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Transparent sol-gel glass ceramics containing β-$NaYF_4$:Yb^{3+}/Er^{3+} nanocrystals: structure, upconversion luminescent properties and optical thermometry behavior

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Abstract

Transparent bulk glass ceramics (GCs) containing $\beta-NaY\mathrm{F}_4{:}Yb^{3+}/Er^{3+}$ upconversion nanocrystals were successfully prepared via a new sol-gel route for the first time. The structure, composition and morphology of the as-fabricated glass ceramics are characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM), which confirm the segregation of *β-$NaYF_4$* nanocrystals in silica glass matrix with the maintenance of their crystalline phase and microstructure. More significantly, intense upconversion (UC) emissions can be realized for Yb^{3+}/Er^{3+} co-doped glass ceramics by profiting from low-phonon-energy environment of

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