

## Accepted Manuscript

Phase evolution and upconversion luminescence enhancement investigation from  $\text{YF}_3$  to  $(\alpha+\beta)\text{-NaYF}_4$  by doping of  $\text{Cu}^{2+}$  ion

Xue Wang, Peng Zhang, Lili Wang, Min Lan, Yizhou Yang, Chen Yang

PII: S0167-577X(18)30165-4

DOI: <https://doi.org/10.1016/j.matlet.2018.01.148>

Reference: MLBLUE 23796

To appear in: *Materials Letters*

Received Date: 2 December 2017

Revised Date: 18 January 2018

Accepted Date: 26 January 2018



Please cite this article as: X. Wang, P. Zhang, L. Wang, M. Lan, Y. Yang, C. Yang, Phase evolution and upconversion luminescence enhancement investigation from  $\text{YF}_3$  to  $(\alpha+\beta)\text{-NaYF}_4$  by doping of  $\text{Cu}^{2+}$  ion, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.01.148>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Phase evolution and upconversion luminescence enhancement investigation from YF<sub>3</sub> to (α+β)-NaYF<sub>4</sub> by doping of Cu<sup>2+</sup> ion**

Xue Wang<sup>a</sup>, Peng Zhang<sup>a</sup>, Lili Wang<sup>b,\*</sup>, Min Lan<sup>b,\*</sup>, Yizhou Yang<sup>b</sup>, Chen Yang<sup>b</sup>

<sup>a</sup>School of Chemistry and Life Sciences, Changchun University of Technology, Changchun 130012, China.

<sup>b</sup>School of Basic Sciences, Changchun University of Technology, Changchun 130012, China.

\*Corresponding author: E-mail address: [wanglili@ccut.edu.cn](mailto:wanglili@ccut.edu.cn)

**ABSTRACT:** A facile, but effective, method has been developed for enhancing the upconversion (UC) luminescence efficiency of YF<sub>3</sub>: Yb<sup>3+</sup>, Er<sup>3+</sup> microcrystals through doping of Cu<sup>2+</sup> ion, accompanied by phase transformation from YF<sub>3</sub> to α-NaYF<sub>4</sub> to (α+β)-NaYF<sub>4</sub>. The Cu<sup>2+</sup> ion occupies the Y<sup>3+</sup> ion crystal lattice site leading to positive vacancy and lower energy barrier in the reaction of forming α-NaYF<sub>4</sub>. In addition, we have also systematically investigated the phase transformation from YF<sub>3</sub> to (α+β)-NaYF<sub>4</sub>. With the extension of the reaction time, surface energy of the [10 $\bar{1}$ 0] crystal plane decreases dramatically while that of the [0001] crystal plane increases accordingly, which may be the main reason for forming (α+β)-NaYF<sub>4</sub>. This synthesis strategy enables UC luminescence enhancement and simultaneous crystal phase transformation, which should inspire more even wider application of other UC host materials.

**Keywords:** Upconversion luminescence, Phase transformation, YF<sub>3</sub>, NaYF<sub>4</sub>, Cu<sup>2+</sup> ion doping

Download English Version:

<https://daneshyari.com/en/article/8013950>

Download Persian Version:

<https://daneshyari.com/article/8013950>

[Daneshyari.com](https://daneshyari.com)