

# **Luminescence, energy transfer, colour modulation and up-conversion mechanisms of Yb<sup>3+</sup>, Tm<sup>3+</sup> and Ho<sup>3+</sup> co-doped Y<sub>6</sub>MoO<sub>12</sub>**

Peng Guo <sup>a</sup>, Jiaxuan Wang <sup>a</sup>, Chuan Liao <sup>a</sup>, Haifeng Zhou <sup>b</sup>, Dapeng Huang <sup>a,\*</sup>,

Guangjun Zhou <sup>a,\*</sup>, Xiaoqiang Yu <sup>a</sup>, Jifan Hu <sup>a</sup>

<sup>a</sup> State Key Laboratory of Crystal Materials, Shandong University, Jinan, 250100, P. R. China.

<sup>b</sup> School of Materials Science and Engineering, Qilu University of Technology (Shandong Academy of Sciences), Jinan, 250353, P. R. China.

**\* Corresponding Author**

Email: gjzhou@sdu.edu.cn (G. J. Zhou); dapenghuang@sdu.edu.cn (D. P. Huang)

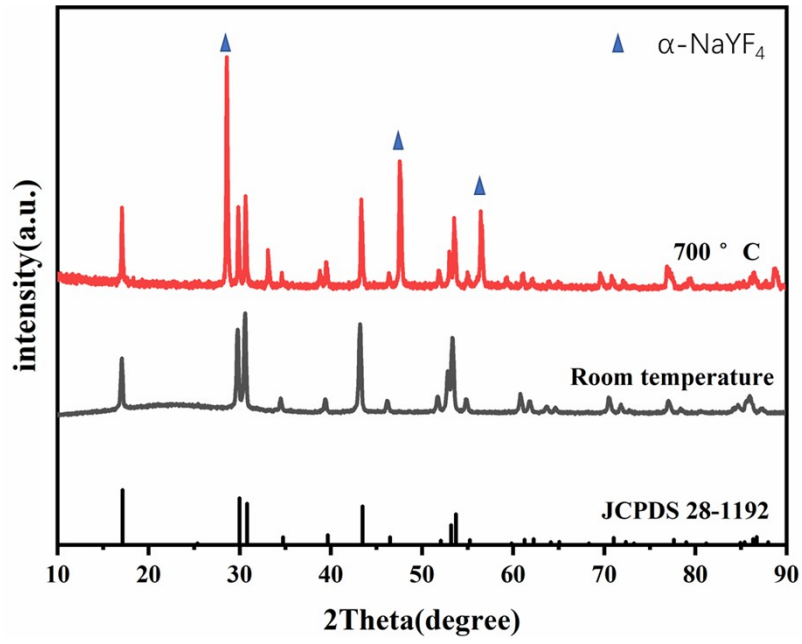


Fig.S1. X-ray diffraction patterns of NaYF<sub>4</sub> annealed at 700 °C and at room temperature

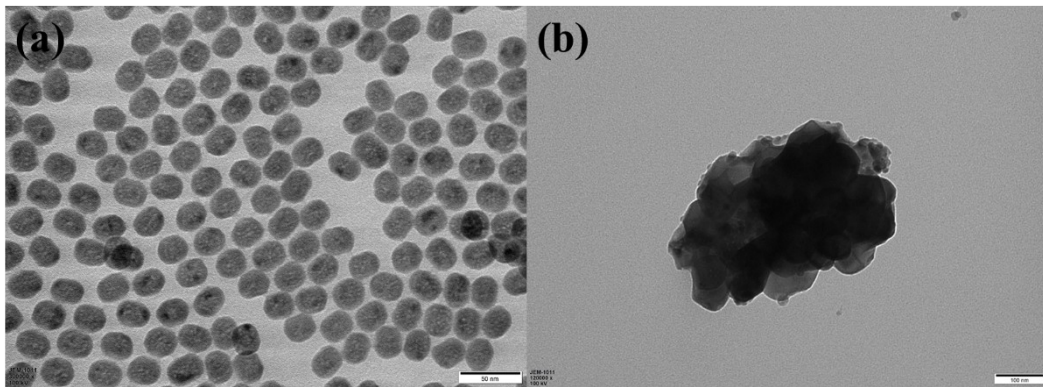


Fig.S2 The TEM images of NaYF<sub>4</sub> annealed at 700 °C and at room temperature

Table S1 Temperature sensing performance of several representative UC optical thermometric materials.

<b>thermometric materials</b>	<b>T range (K)</b>	<b>Max. <math>S_A</math> (<math>K^{-1}</math>)</b>	<b>Max. <math>S_R</math> (% <math>K^{-1}</math>)</b>	<b>Ref.</b>
<b>BaWO6:Yb:Er</b>	<b>303-573</b>	<b>0.0025</b>	<b>1.21</b>	<b>48</b>
<b>Y2WO6:Yb:Er</b>	<b>293-573</b>	<b>0.0022</b>	<b>0.1</b>	<b>49</b>
<b>SiO2:Er</b>	<b>295-873</b>	<b>0.001</b>	<b>-</b>	<b>50</b>
<b>TeO2-WO2:Yb:Er</b>	<b>300-690</b>	<b>0.0028</b>	<b>-</b>	<b>51</b>
<b>Gd2Mo3O9:Yb:Er</b>	<b>300-460</b>	<b>0.0105</b>	<b>-</b>	<b>52</b>
<b>Y6MoO12:Yb:Tm:Ho</b>	<b>298-498</b>	<b>0.0032</b>	<b>0.85</b>	<b>This work</b>