Supporting Information

Optical Spectroscopy of Eu^{3+} doped ZnO Nanocrystals

Yongsheng Liu,[†] Wenqin Luo,[†] Renfu Li,[†] Guokui Liu,[‡] Mark R. Antonio,[‡] and

Xueyuan Chen^{†,*}

State Key Laboratory of Structural Chemistry, Key Laboratory of Materials Chemistry and Physics, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, Fujian 350002, China, and Chemistry Division, Argonne National Laboratory, Argonne, Illinois 60439, USA

Figure S1. XRD patterns of Eu^{3+} : ZnO (1.05 at.%) nanocrystals annealed at different temperatures. All the peaks can be indexed to be ZnO with hexagonal wurtzite structure (JCPDS No. 36-1451, space group $P6_3mc$). The average sizes of the nanocrystals annealed at 40, 200, 300, and 400°C are estimated to be 5, 8, 9 and 11 nm, respectively.

[†] Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences.

[‡] Argonne National Laboratory.

* Corresponding author. Phone and fax: +86-591-8764-2575. E-mail: xchen@fjirsm.ac.cn.

Figure S2. PL intensity of Eu^{3+} in ZnO nanocrystals annealed at 400°C as a function of the Eu^{3+} content. The PL intensities of both sites A and B increase gradually with the increase of the Eu^{3+} contents being incorporated in the nanocrystals, although an exception was observed for the sample with Eu^{3+} content of 1.6 at.%, where the PL intensities of both sites are unexpectedly weakened for unknown reason.

Figure S3. The 10 K excitation spectra of $\text{Eu}^{3+}:\text{ZnO}$ (1.05 at.%) nanocrystals annealed at 400°C by monitoring the $^5\text{D}_0\text{-}^7\text{F}_2$ emission for Eu^{3+} at sites A and B. The inset enlarges the region of $^7\text{F}_0\rightarrow^5\text{D}_0$ in the excitation spectra for Eu^{3+} at site B.

Figure S4. The 10 K site-selective emission spectra of $\text{Eu}^{3+}:\text{ZnO}$ (1.05 at.%) nanocrystals annealed at 400°C under the 464.8 nm excitation for Eu^{3+} at site A.

Figure S5. XRD patterns of $\text{Eu}^{3+}:\text{ZnO}$ (1.05 at.%) nanocrystals annealed at 500°C . The peaks marked with star signs are main peaks of cubic Eu_2O_3 impurity phase.