Electronic Supporting Information

Yttrium hydroxide fluoride based monodisperse mesocrystals: additive-free synthesis, enhanced fluorescent properties, and potential application in temperature sensing

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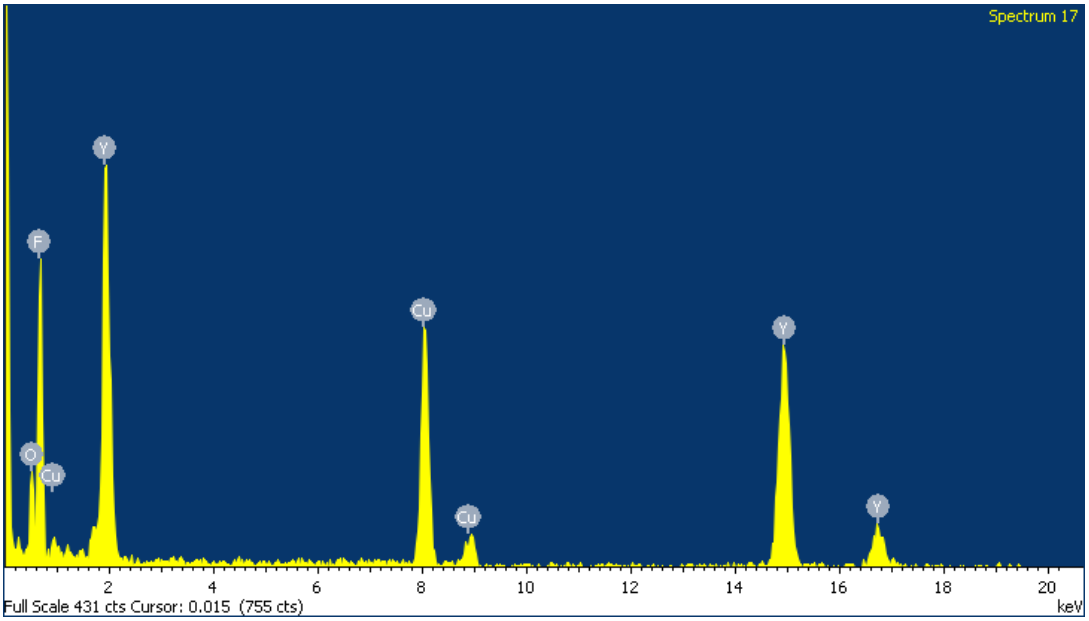

Figure S1 EDS spectrum of as-obtained YHF mesocrystal

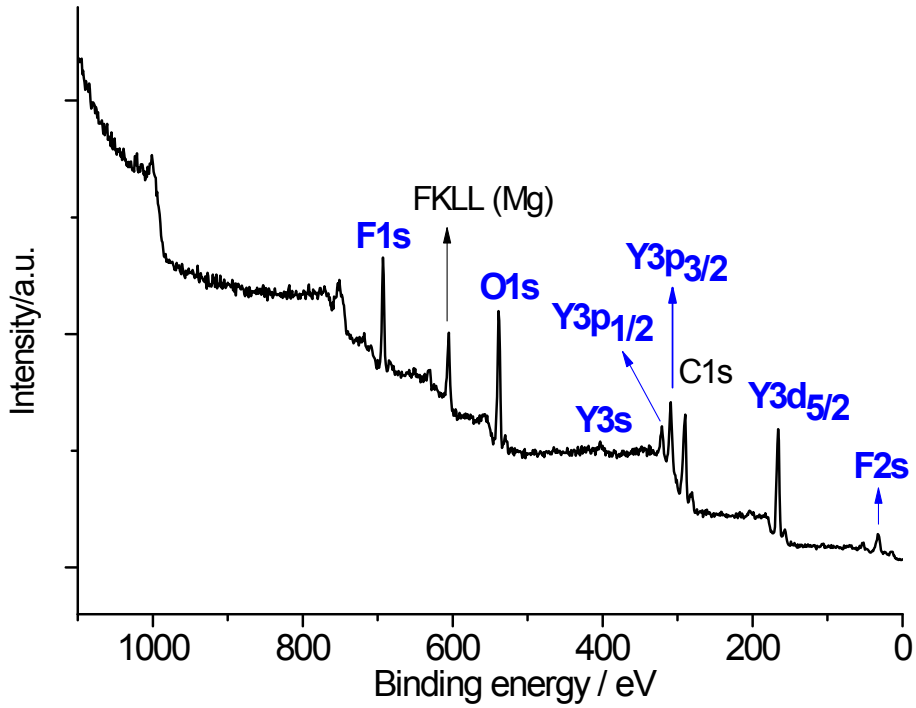

Figure S2 X-ray photoelectron survey spectrum of as-obtained YHF mesocrystal (The peak at 284.6 eV is due to C1s, which was used to calibrate the binding energy).

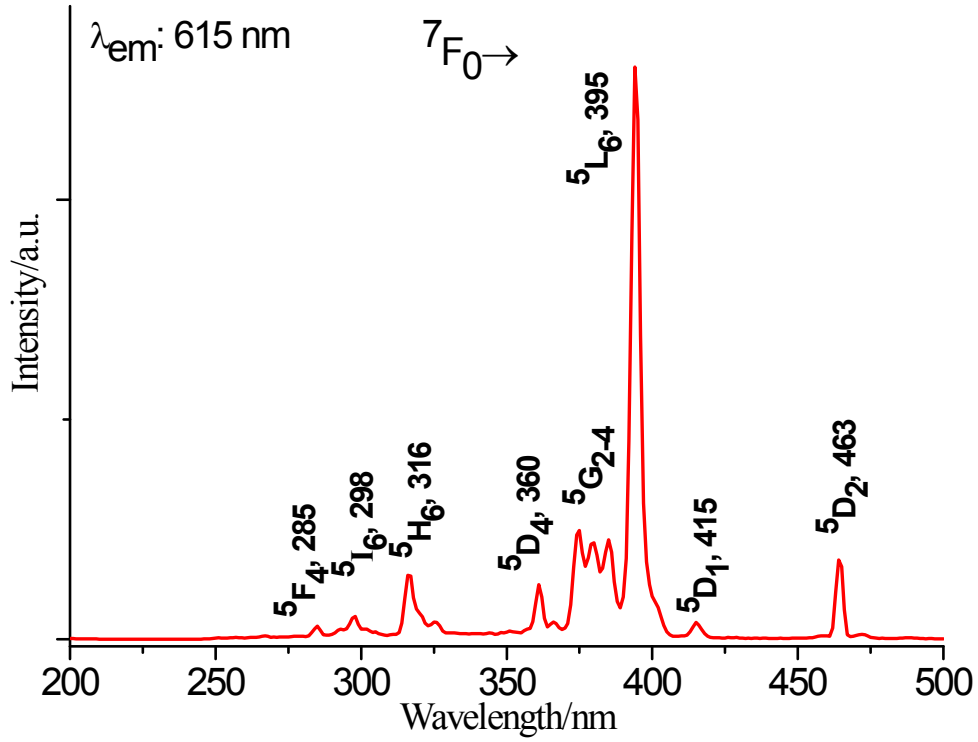

Figure S3 Room temperature excitation spectrum of YHF:Eu^{3+} mesocrystalline phosphor (The detailed assignments of every peak are labeled).

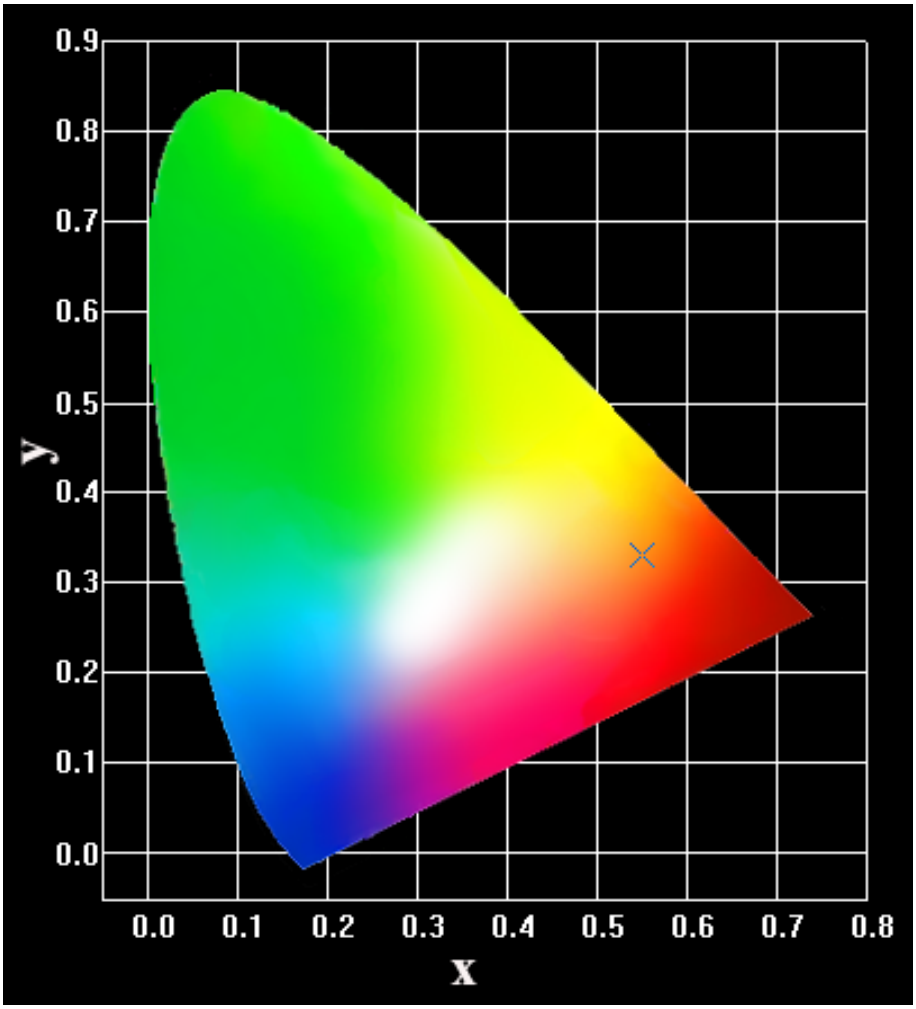

Figure S4 CIE chromaticity diagram for YHF:Eu^{3+} mesocrystalline phosphor.

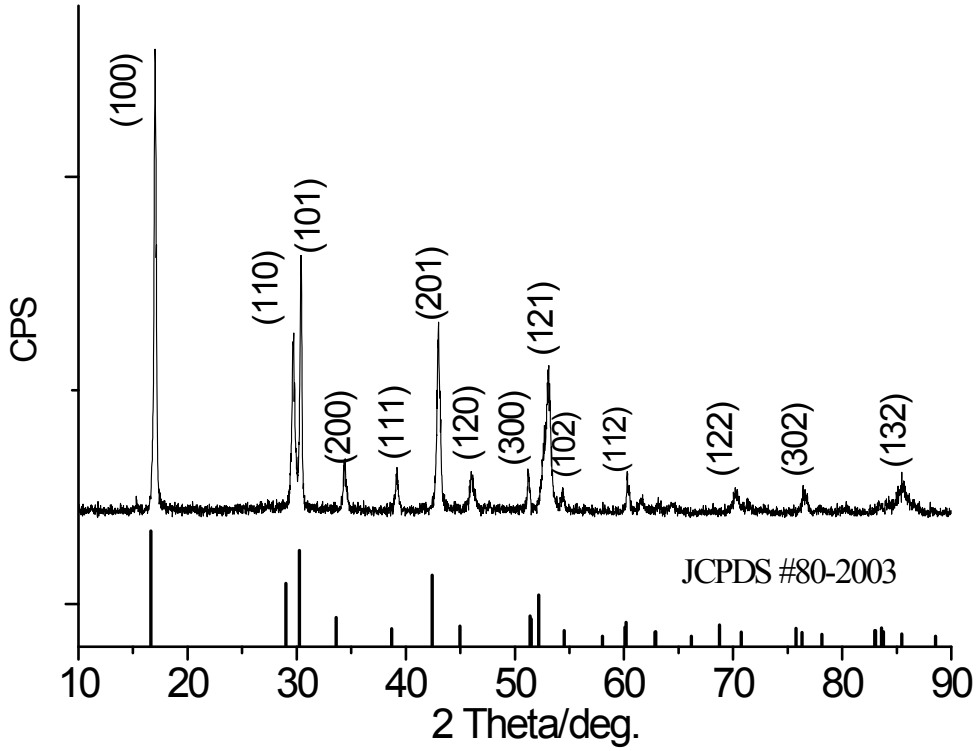

Figure S5 XRD pattern of as-synthesized YHF:Eu^{3+}(5 mol%) microcrystal phosphor.

XRD pattern of YHF:Eu^{3+}(5 mol%) microcrystal phosphor can be identified as $Y(OH)_{3-x}F_x$ phase with hexagonal structure.

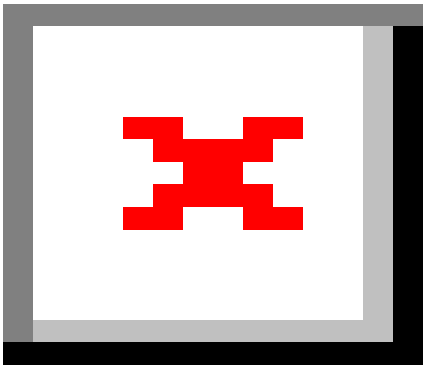

Figure S6 SEM image of YHF:Eu^{3+}(5 mol%) microcrystal phosphor. This microcrystal phosphor shows rod-like morphology and displays a relatively uniform size with several micrometers in length and 160–250 nm in diameter. In addition, some nanoparticles are attached on the surfaces of rod-like microcrystals. The morphology is similar to those reported previously for YHF obtained through hydrothermal reaction at 450 ℃. [See B. Q. Liu, K. Guo, J. Wang, Z. J. Zhang, Y. Tao, Y. Huang and J. T. Zhao, *Mater. Lett.*, 2013, **100**, 245.]

Table S1 Summary of the Asymmetry Ratio, Lifetime, and Quantum Yield of YHF:Eu^{3+}(5 mol%) mesocrystalline and microcrystal phosphors

Sample	Asymmetric Ratio	Lifetime (ms)	Quantum Yield (%)
YHF:Eu^{3+} mesocrystalline	2.52	1.28	41.5
YHF:Eu^{3+} microcrystal	1.87	0.87	20.9