**Supplementary information**

# Tunable Broadband Visible Emission Achieved by Phase Transformation-Driven Self-Reduction of $Eu^{3+}$ to $Eu^{2+}$ in Calcium Phosphate Matrix

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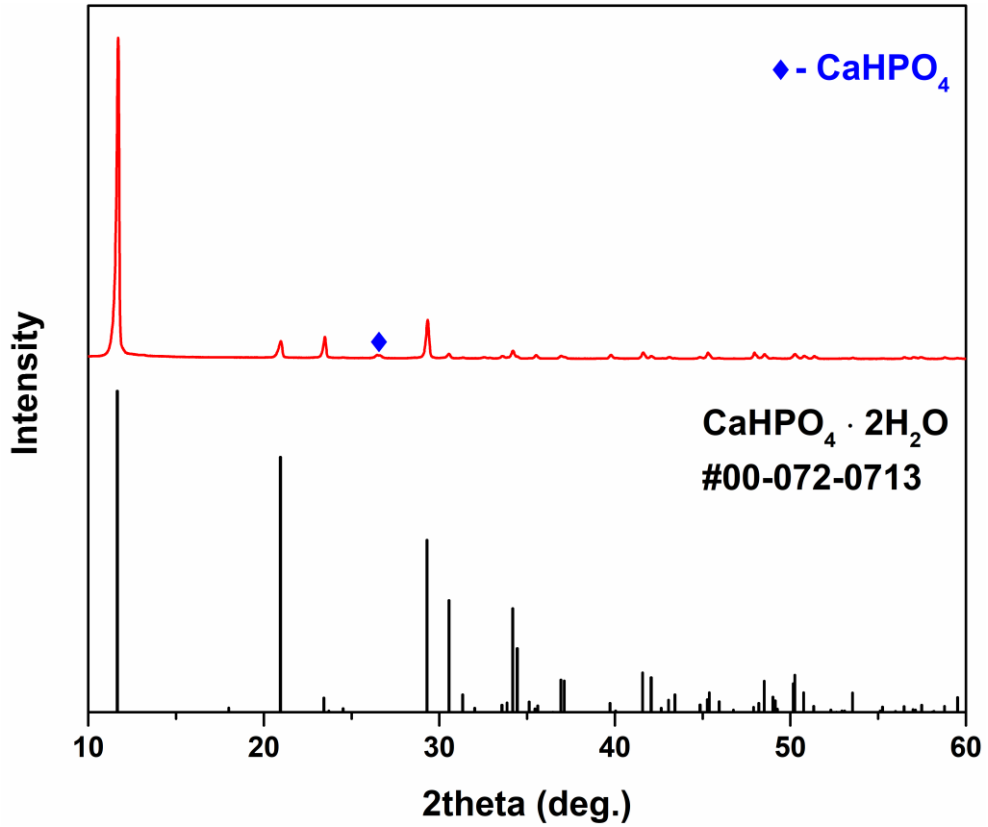


**Figure S1.** XRD pattern of as-prepared Eu-doped DCPD powder.

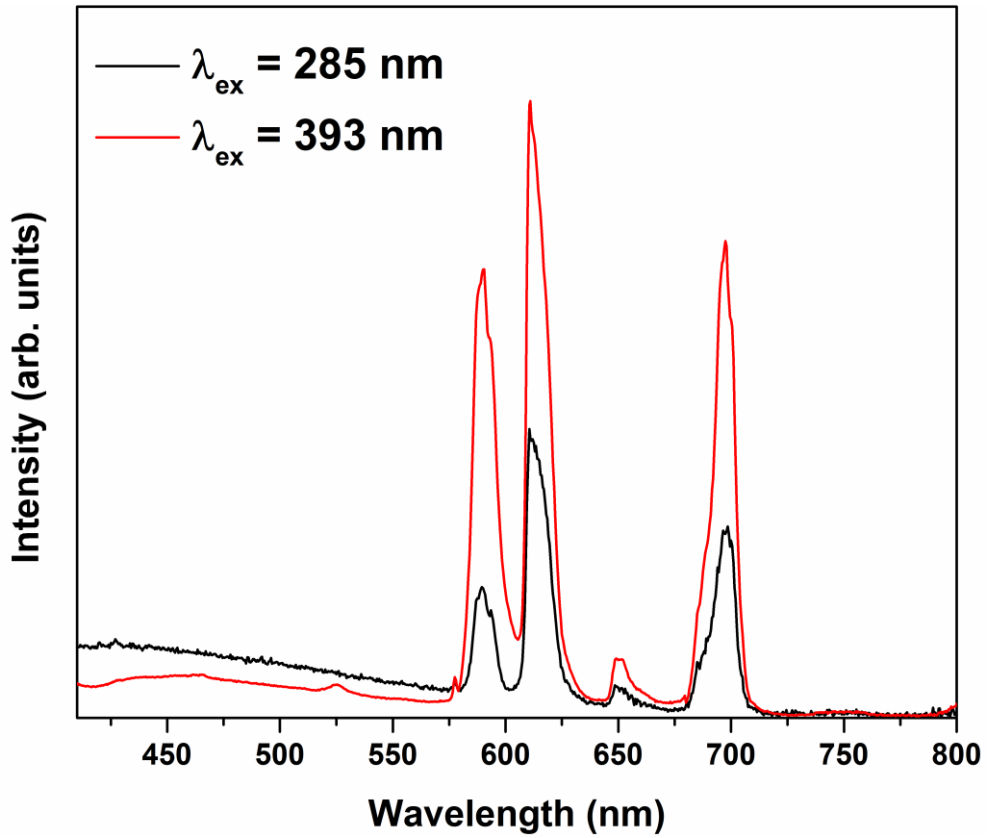


**Figure S2.** PL spectra of as-prepared Eu-doped DCPD powder.

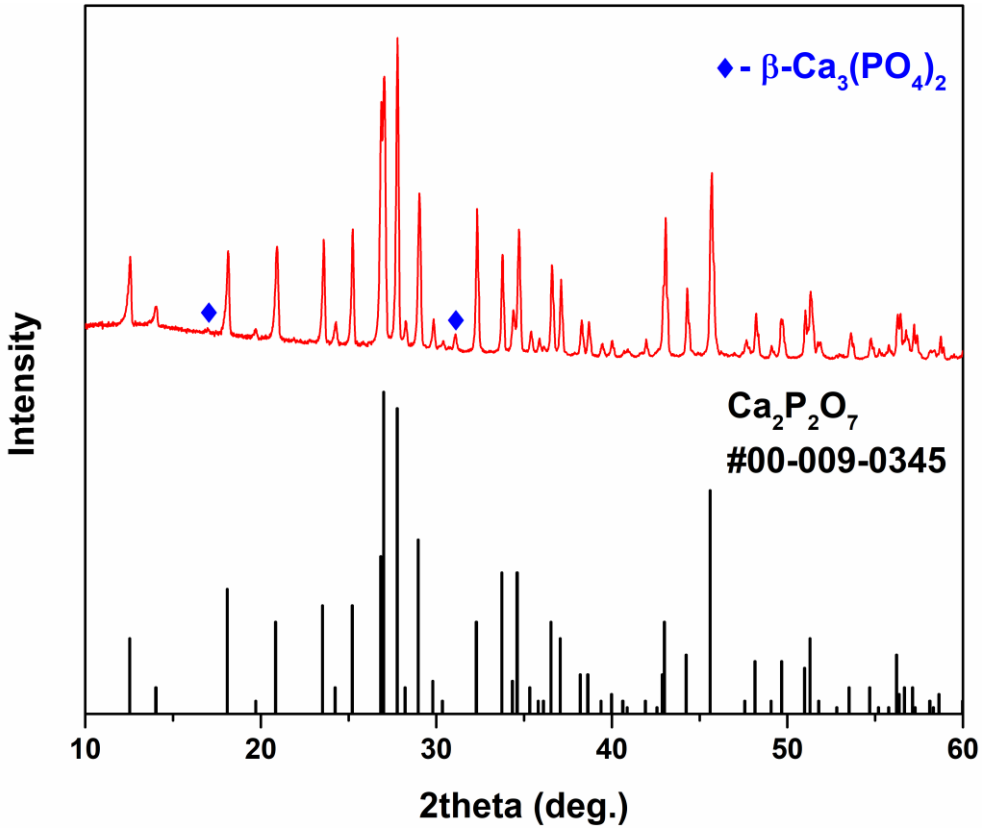


**Figure S3.** XRD pattern of as-prepared powder annealed at 1300 °C in air.

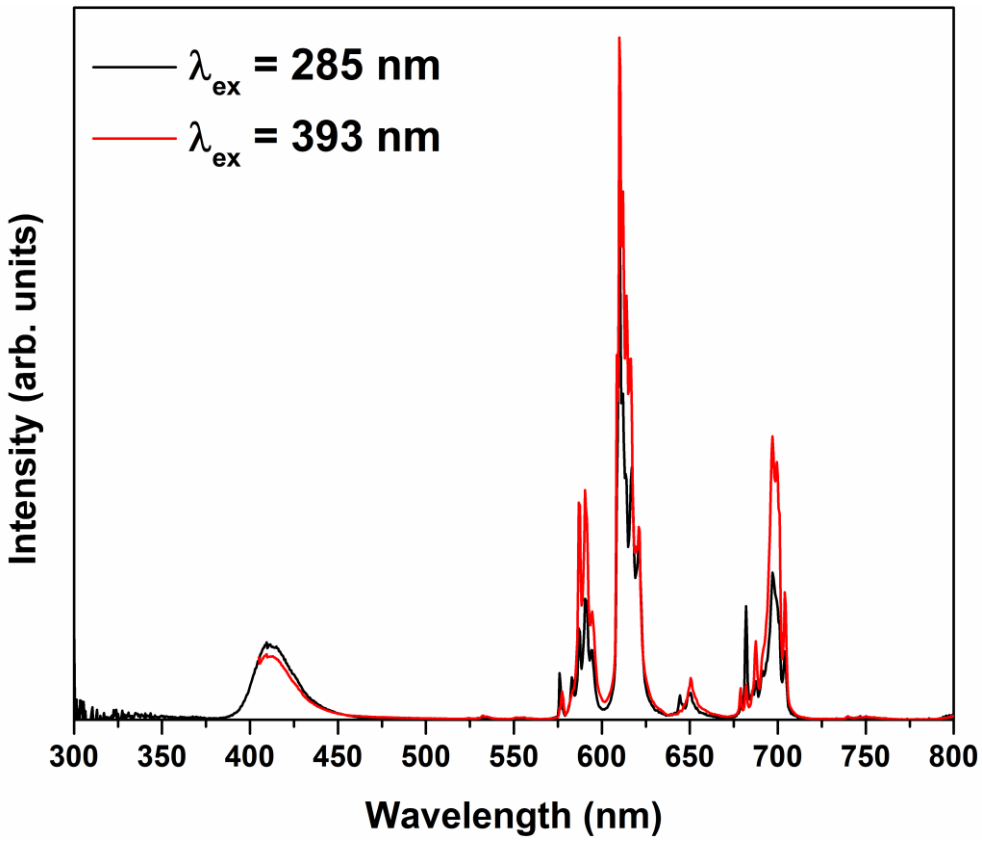


**Figure S4.** PL spectra of as-prepared powder annealed at 1300 °C in air.

**Table S1.** Excitation wavelength dependent CIE 1931 chromaticity coordinates.

| Excitation wavelength, nm | CIE (*x*, *y*) |
|---|---|
| 250 | 0.21920; 0.29286 |
| 260 | 0.21465; 0.30055 |
| 270 | 0.20647; 0.28307 |
| 280 | 0.20265; 0.27034 |
| 290 | 0.20182; 0.26169 |
| 300 | 0.20363; 0.25755 |
| 310 | 0.20404; 0.25116 |
| 320 | 0.21129; 0.26606 |
| 330 | 0.22601; 0.29371 |
| 340 | 0.23962; 0.31359 |
| 350 | 0.24773; 0.32624 |
| 360 | 0.25282; 0.33702 |
| 370 | 0.25353; 0.33996 |
| 380 | 0.26667; 0.36833 |
| 390 | 0.28493; 0.40388 |
| 400 | 0.30516; 0.43105 |
| 410 | 0.32119; 0.45408 |
| 420 | 0.33428; 0.46918 |

**Table S2.** Temperature-dependent CIE 1931 chromaticity coordinates.

| Temperature (K) | $\lambda_{ex}$ = 285 nm | $\lambda_{ex}$ = 393 nm |
|---|---|---|
| | CIE (*x*, *y*) | CIE (*x*, *y*) |
| 77 | 0.22525; 0.31084 | 0.38503; 0.40863 |
| 100 | 0.2317; 0.32163 | 0.40441; 0.43938 |
| 150 | 0.23752; 0.31731 | 0.40345; 0.44041 |
| 200 | 0.23335; 0.3015 | 0.38939; 0.42944 |
| 250 | 0.2207; 0.28069 | 0.36536; 0.41848 |
| 300 | 0.21317; 0.27154 | 0.33954; 0.40828 |
| 350 | 0.20722; 0.26788 | 0.29712; 0.38353 |
| 400 | 0.21491; 0.28792 | 0.27564; 0.36505 |
| 450 | 0.22334; 0.30018 | 0.27712; 0.36083 |