Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Wet-chemical Preparation of Barium Magnesium Orthophosphate, $Ba_2Mg(PO_4)_2:Eu^{2+}$, Nanorod Phosphor with Enhanced Optical and Photoluminescence Properties

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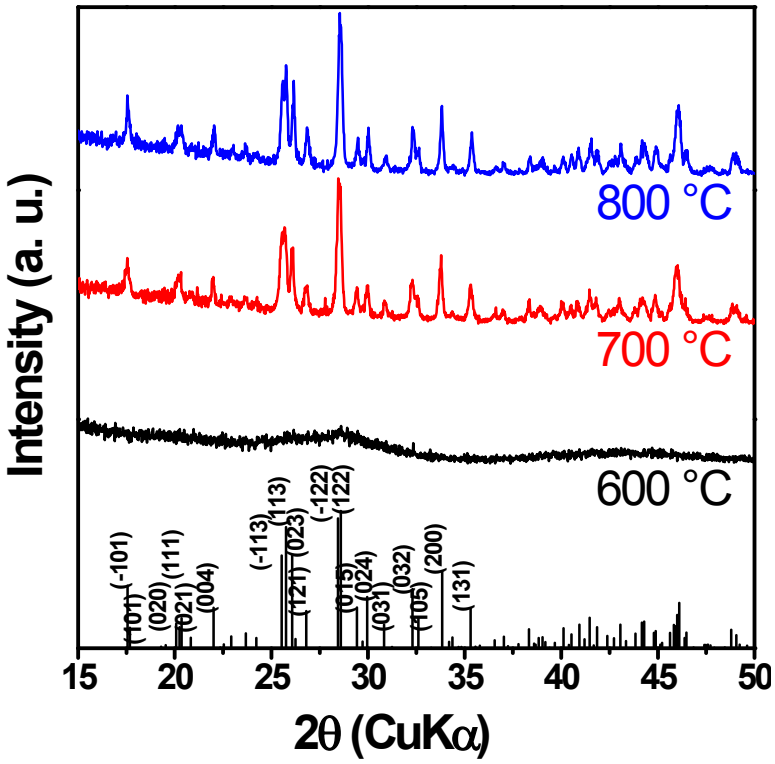

Figure S1. XRD patterns of BMP09 samples annealed at different temperatures (600, 700, and 800 °C) for 2 h, showing that a phase-pure $Ba_2Mg(PO_4)_2$ orthophosphate compound are formed at above 700 °C.

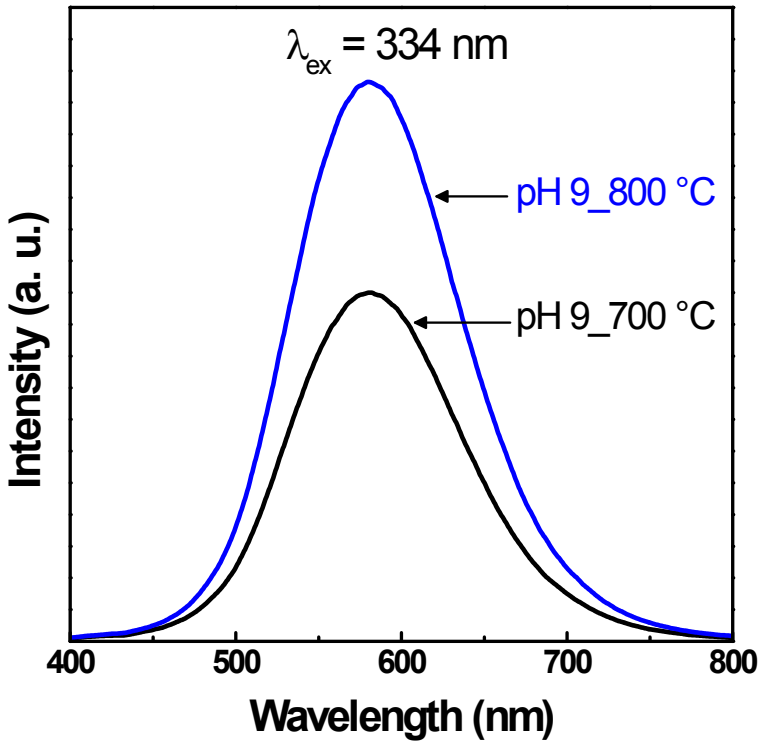

Figure S2. Photoluminescence emission spectra of BMP09 nanophosphors post-annealed at 700 °C and 800 °C in reducing atmosphere. The BMP09_800 sample shows higher PL intensity than BMP09_700 sample, which is due to its high crystallinity.

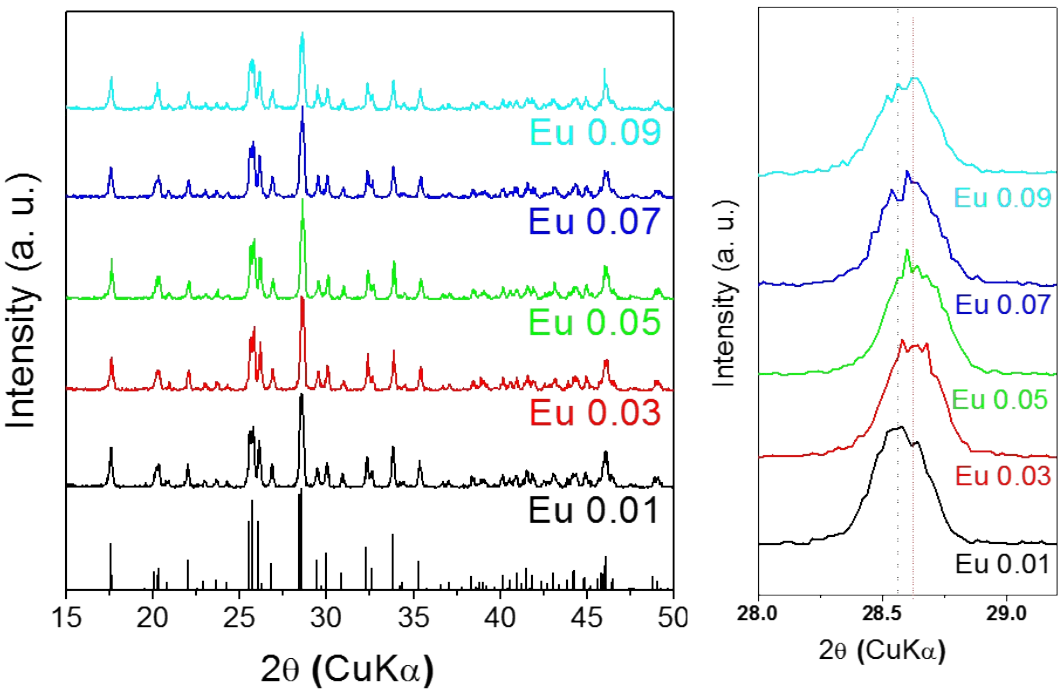

Figure S3. XRD patterns of $Ba_{2-2x}Mg(PO_4)_2$: $Eu^{2+}{}_x$: x= 0.01, 0.03, 0.05, 0.07, 0.09, annealed at 800 ^oC. As increasing Eu^{2+} doping amount, the main XRD peak near 28.5O shifted toward a high angle, implying a successful incorporation of Eu^{2+} ions into BMP host matrix.

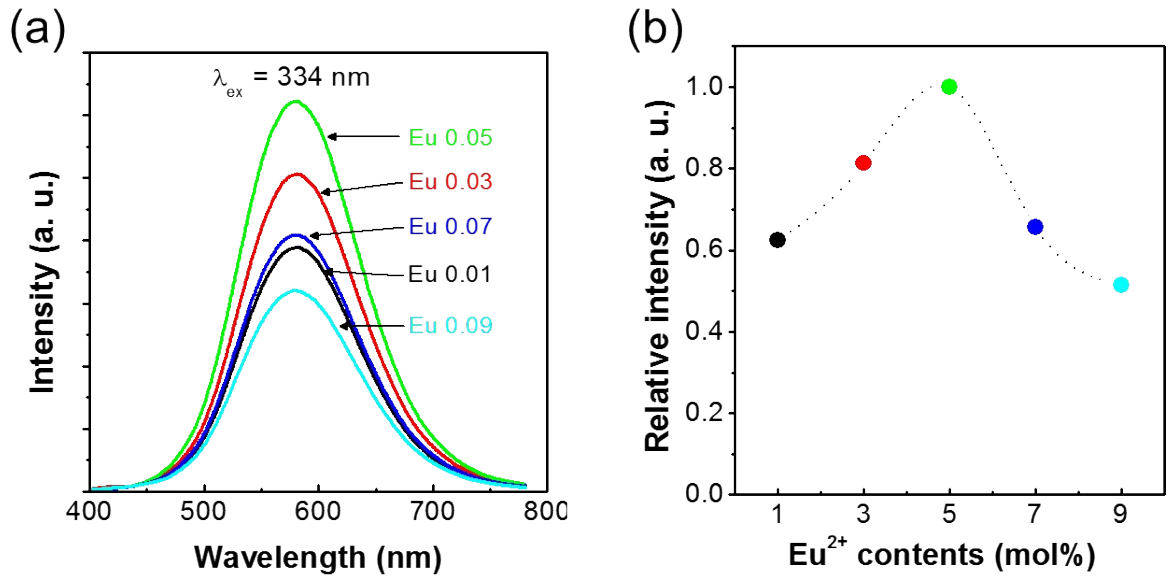

Figure S4. Photoluminescence emission spectra of micro-sized bulk BMP:Eu phosphors synthesized by a solid-state reaction method (1200 ^{o}C/2h) as a function of Eu^{2+} concentration.

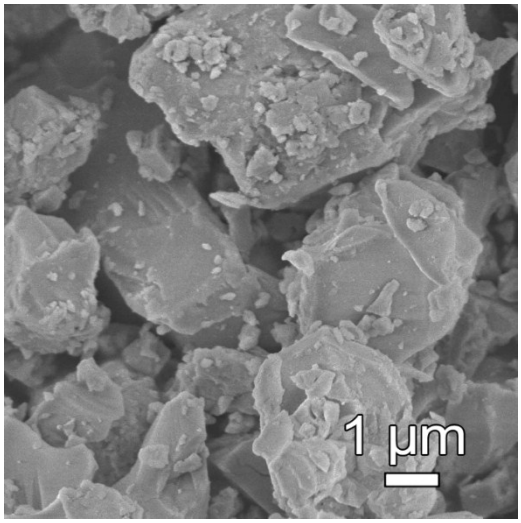

Figure S5. SEM image of micro-sized bulk BMP:Eu phosphors synthesized by a solid-state reaction method (5 mol.% of Eu^{2+}, 1200 ^{o}C/2h).

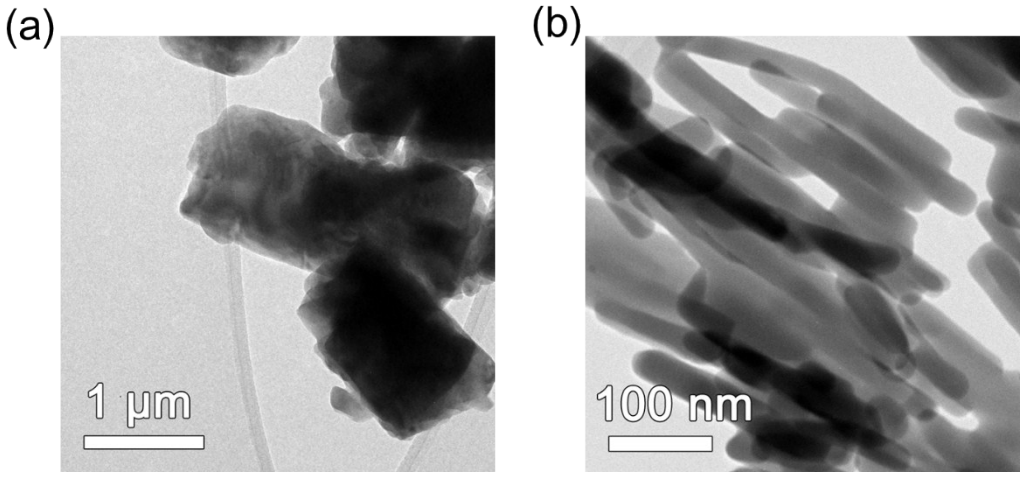

Figure S6. Comparison of TEM image of the bulk and nanorod BMP:Eu phosphors, showing irregular/rough surface for the bulk BMP:Eu and smooth/uniform surface for the nanorod BMP:Eu phosphors. This different surface roughness may affect the light absorption as well as PL intensity.