

## Supporting Information

### Large-scale production of fine-sized $Zn_2SiO_4:Mn$ phosphor microspheres with dense structure and high photoluminescence property by spray-drying process

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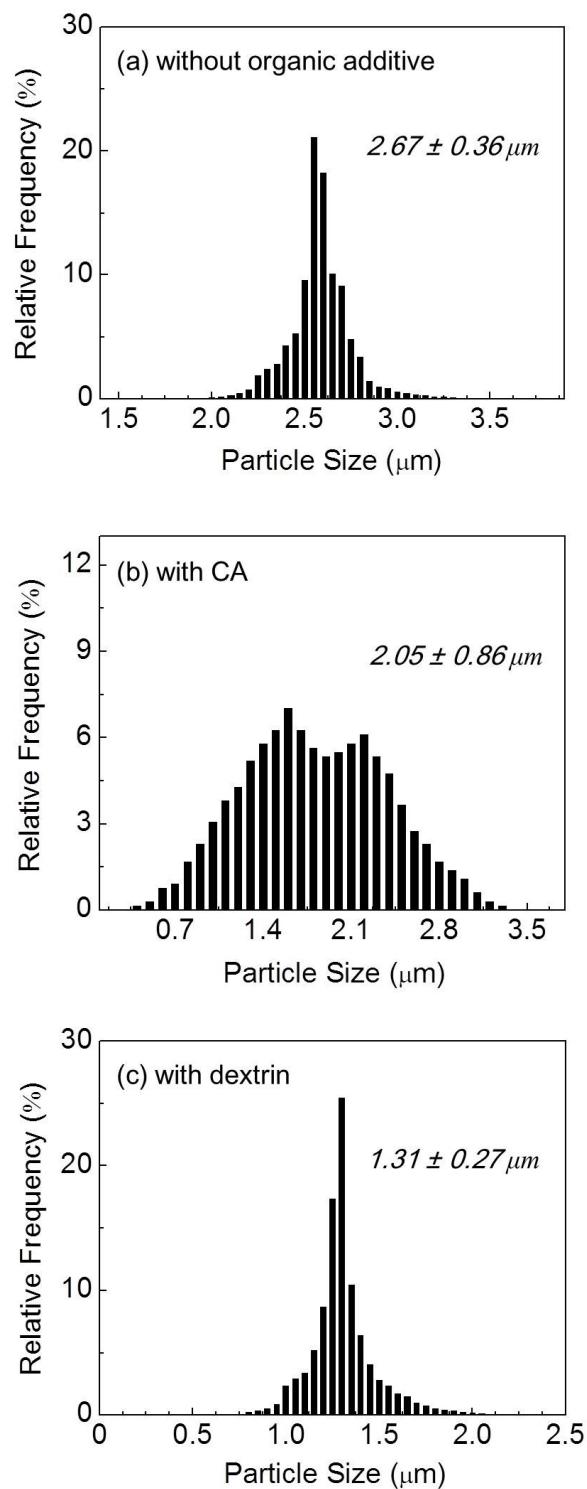
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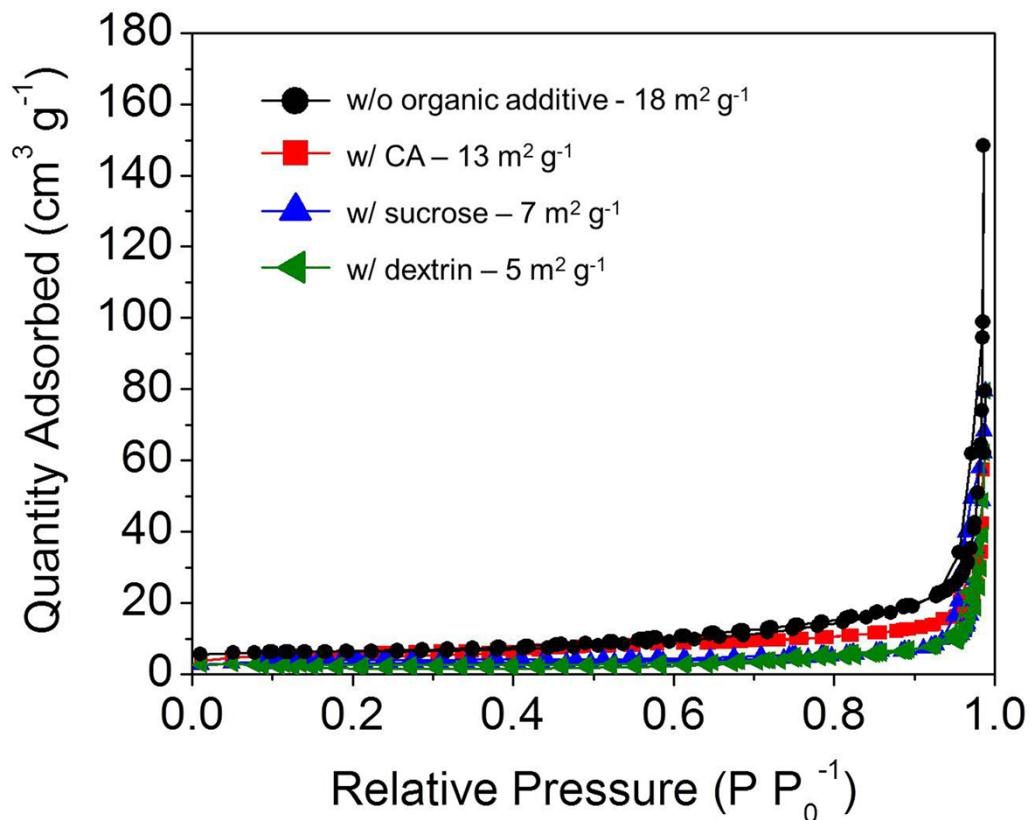
Keywords: luminescence, phosphor, gas-phase reaction, ceramics, spray drying

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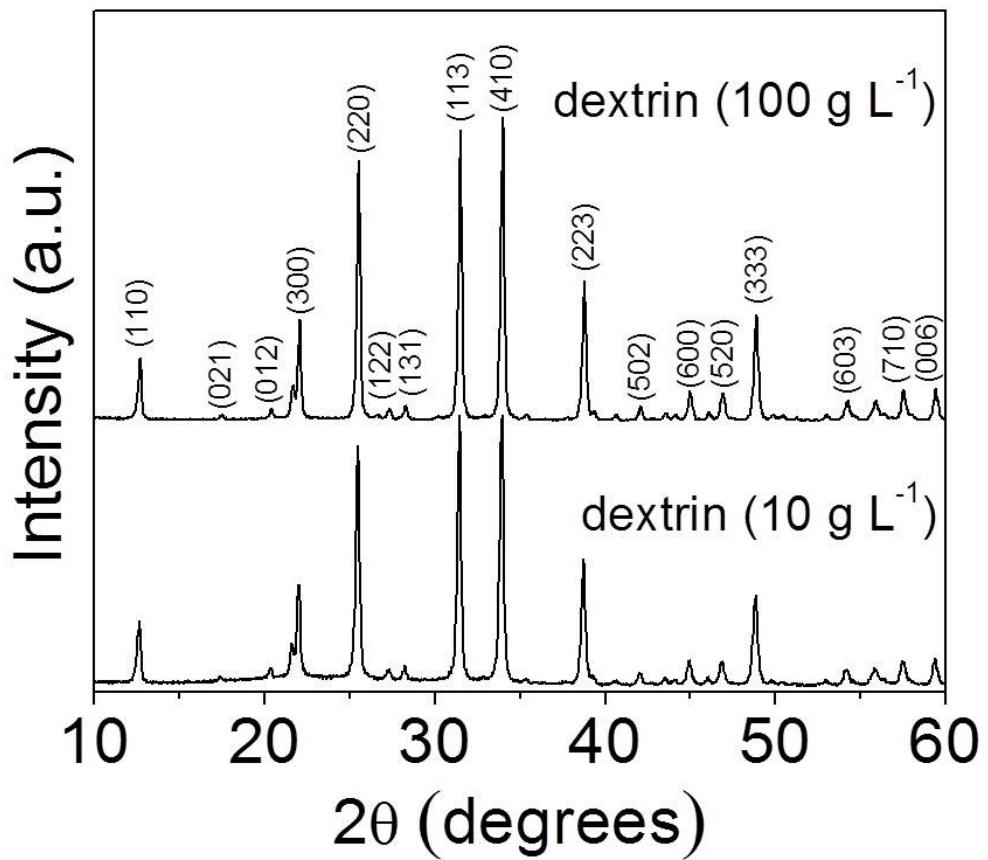
- Particle size distributions of the post-treated  $Zn_2SiO_4:Mn$  phosphor powders obtained from the solutions (a) without organic additive, (b) with CA, and (c) with dextrin.
- $N_2$  adsorption-desorption isotherms measured at 77 K for the post-treated  $Zn_2SiO_4:Mn$  powders prepared from the spray solutions without organic additive, and with CA, sucrose, and dextrin.
- XRD patterns of the post-treated  $Zn_2SiO_4:Mn$  powders prepared from the solutions with different concentration of dextrin.
- Formation mechanism of solid, hollow, and nano-sized  $Zn_2SiO_4:Mn$  powders prepared from the solutions with different concentration of dextrin.
- Schematic diagram and digital photo of spray dryer applied in the preparation of precursor powders.



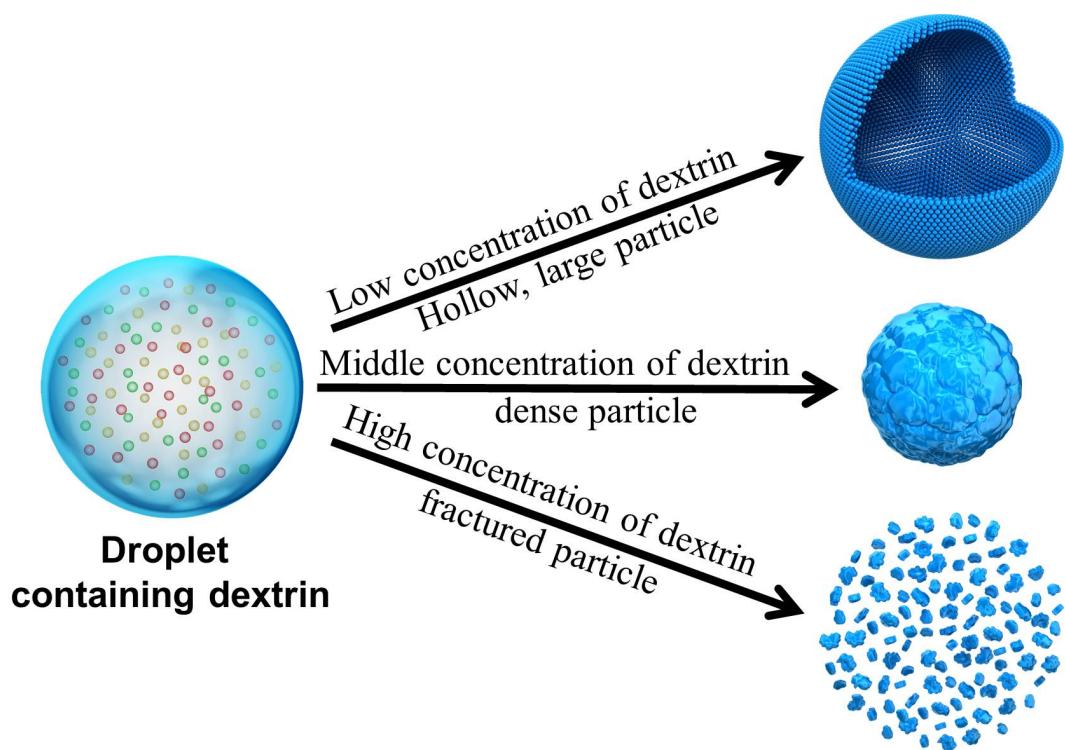
**Figure S1.** Particle size distributions of the post-treated  $\text{Zn}_2\text{SiO}_4:\text{Mn}$  phosphor powders obtained from the spray solutions (a) without organic additive, (b) with CA, and (c) with dextrin.



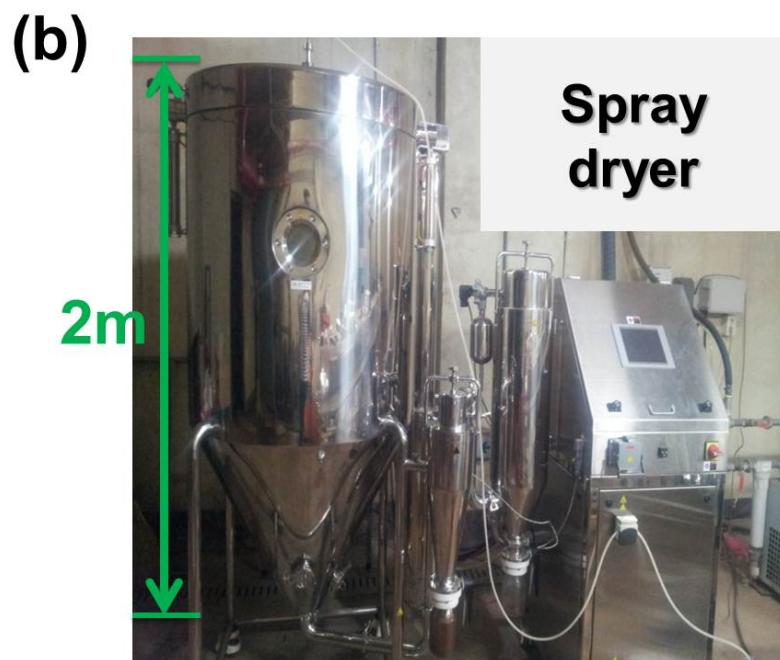
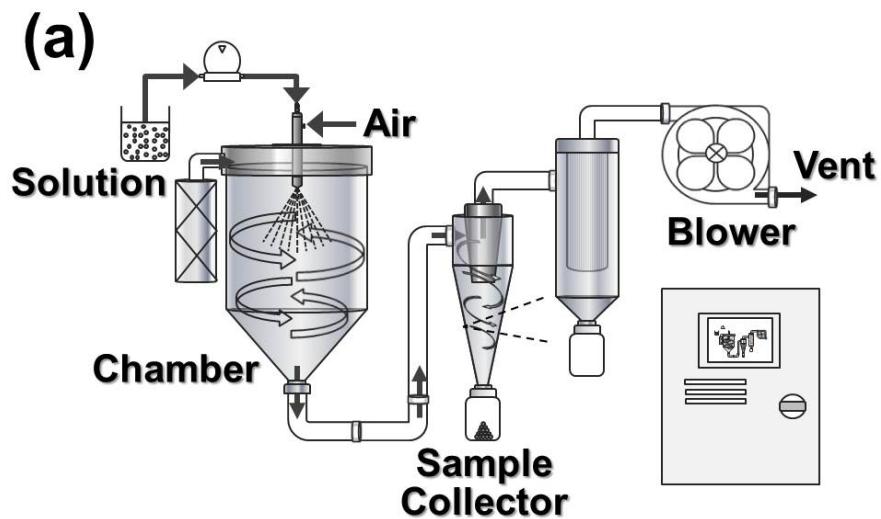
**Figure S2.**  $\text{N}_2$  adsorption-desorption isotherms measured at 77 K for the post-treated  $\text{Zn}_2\text{SiO}_4:\text{Mn}$  powders prepared from the spray solutions without organic additive, and with CA, sucrose, and dextrin.



**Figure S3.** XRD patterns of the post-treated  $\text{Zn}_2\text{SiO}_4$ :Mn powders prepared from the solutions with different concentration of dextrin.



**Scheme S1.** Formation mechanism of solid, hollow, and nano-sized Zn<sub>2</sub>SiO<sub>4</sub>:Mn powders prepared from the solutions with different concentration of dextrin.



**Figure S4.** Schematic diagram and digital photo of spray dryer applied in the preparation of precursor powders.