Supporting Information

Yolk-shell structured $Gd_2O_3:Eu^{3+}$ phosphor prepared by spray pyrolysis: Effect of preparation conditions on microstructure and luminescence properties

Jung Sang Cho[a], Kyeong Youl Jung[b], Yun Chan Kang*[a]

[a] Department of Materials Science and Engineering, Korea University, Anam-Dong, Seongbuk-Gu, Seoul 136-713, Republic of Korea

[b] Department of Chemical Engineering, Kongju National University, 1223-24 Cheonan-Daero, Seobuk-gu, Cheonan, Republic of Korea

This file includes:

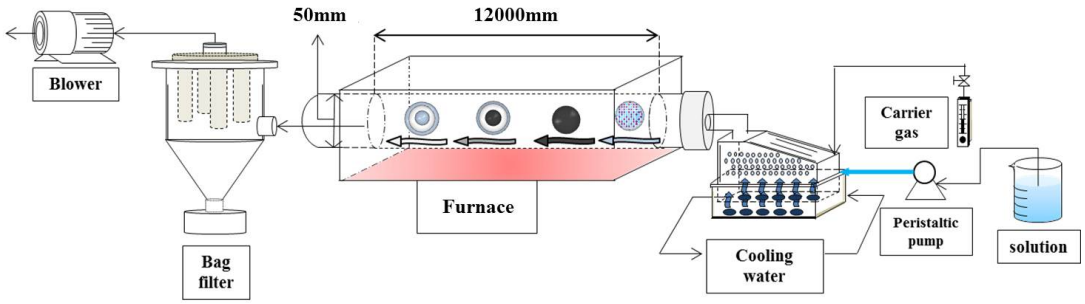

Figure S1. Schematic diagram of the large scale ultrasonic spray pyrolysis process.

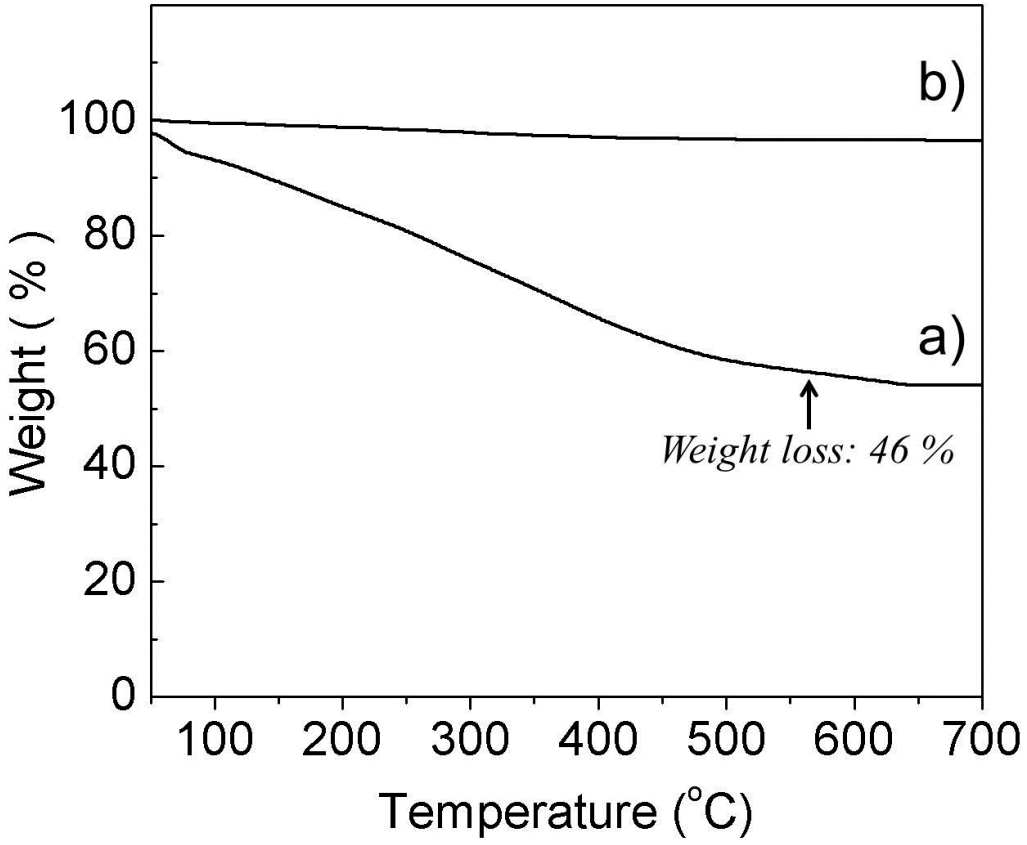

Figure S2. Thermogravimetric analysis of the $Gd_2O_3:Eu^{3+}$ phosphor powders prepared at different temperatures: a) 400 °C, b) 1000 °C .

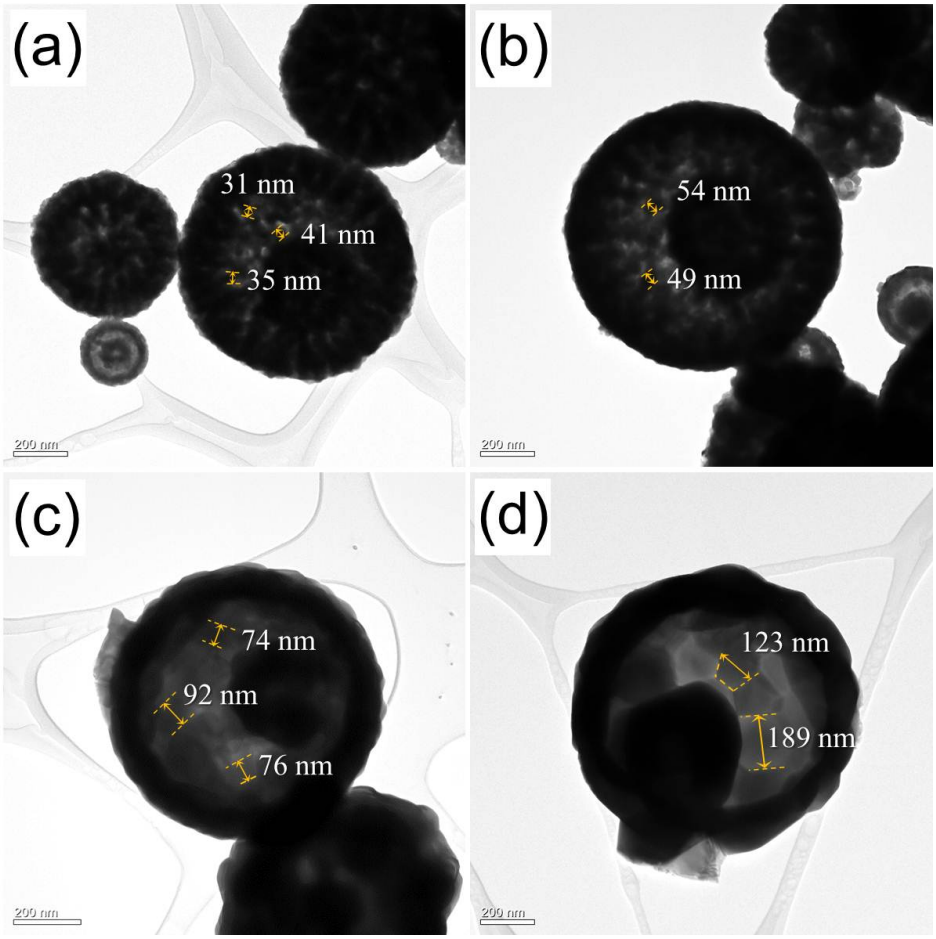

Figure S3. TEM images of the post heat-treated $Gd_2O_3:Eu^{3+}$ phosphor powders prepared at the temperature of 1000 °C: (a) 900 °C, (b) 1000 °C, (c) 1100 °C, and (d) 1200 °C.

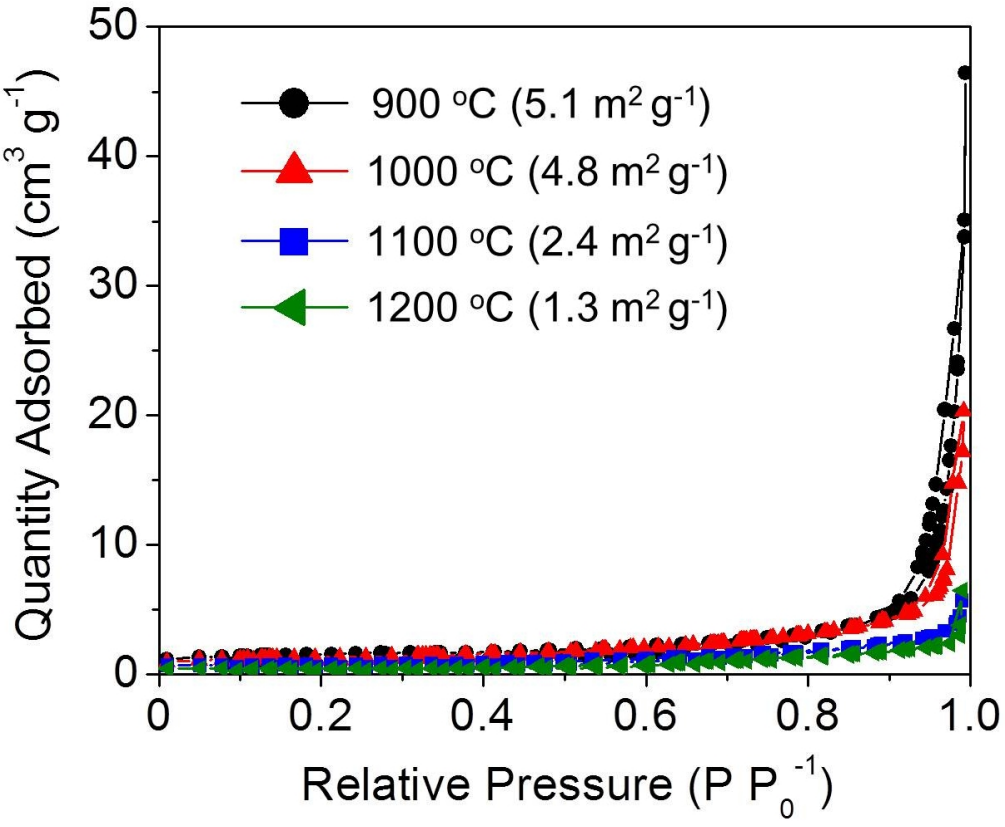

Figure S4. N_2 adsorption-desorption isotherms measured at 77 K for the $Gd_2O_3:Eu^{3+}$ yolk-shell phosphor powders post-treated at various temperatures.

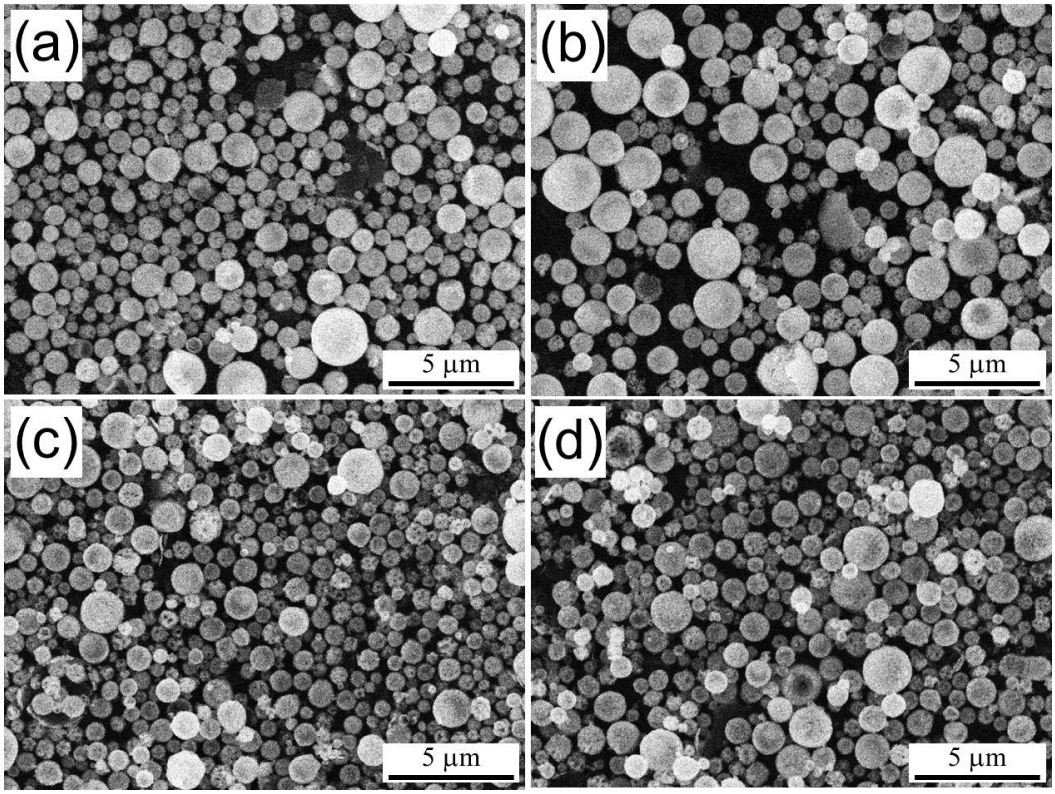

Figure S5. SEM images of the post heat-treated Gd_2O_3:Eu^{3+} phosphor powders prepared at the temperature of 1000 ^oC: (a) 900 ^oC, (b) 1000 ^oC, (c) 1100 ^oC, and (d) 1200 ^oC.

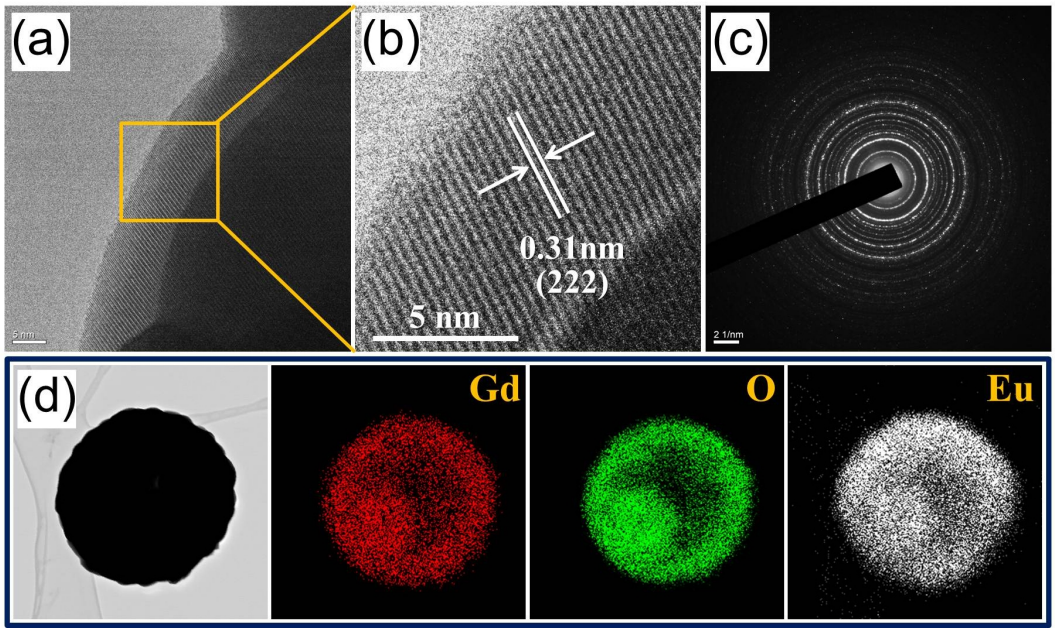

Figure S6. Morphologies and elemental mapping images of the post heat-treated Gd_2O_3:Eu^{3+} phosphor powders at 1100 ^{o}C: (a) TEM image of the powder, (b) HR-TEM image of the powder, (c) SAED pattern of the powder, and (d) dot-mapping images of the powder.