Supporting Information for

Construction of Hybrid Multi-shell Hollow Structured CeO_2-MnO_x Materials for Selective Catalytic Reduction of NO with NH_3

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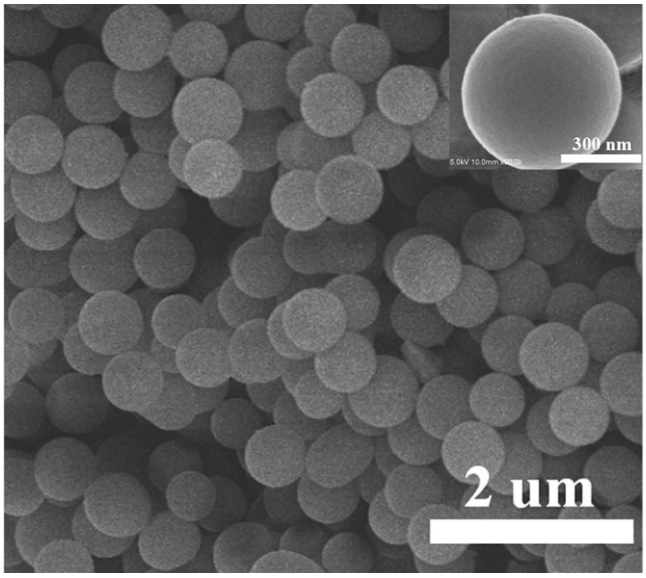

Figure S1 SEM image of carbon spheres. (Inset shows individual carbon sphere)

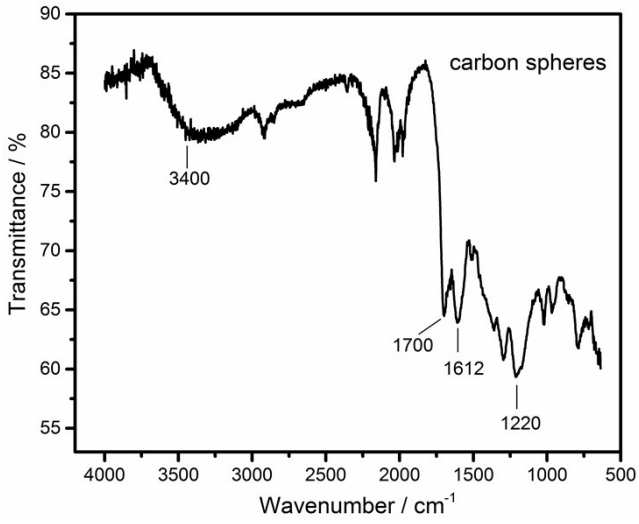

Figure S2 FT-IR spectrum of obtained carbon spheres.

The absorption peaks at 3400 cm^{-1} and 1612 cm^{-1} were attributed to the stretching and bending vibration of -OH, respectively. While the weak absorption peaks at 1700 cm^{-1} and 1220 cm^{-1} exhibited stretching vibration of C=O and C-O, respectively. The result indicated the

existence of abundant superficial active functional groups on the surface of obtained carbon spheres, including -COOH, -OH, C=O, etc.

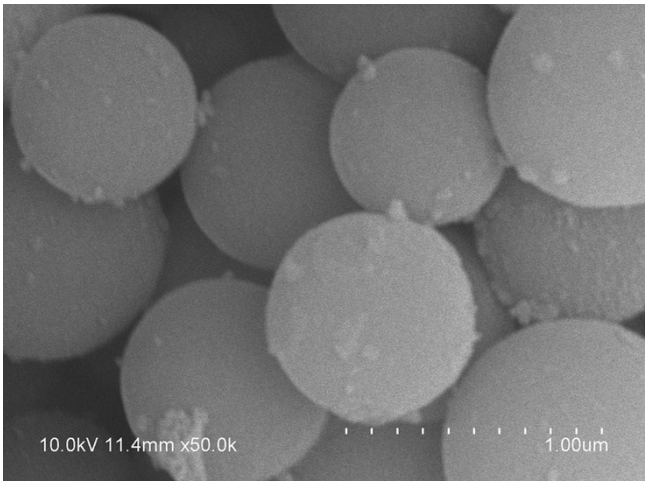

Figure S3 SEM image of CSs@CeO_2-MnO*x* precursor.

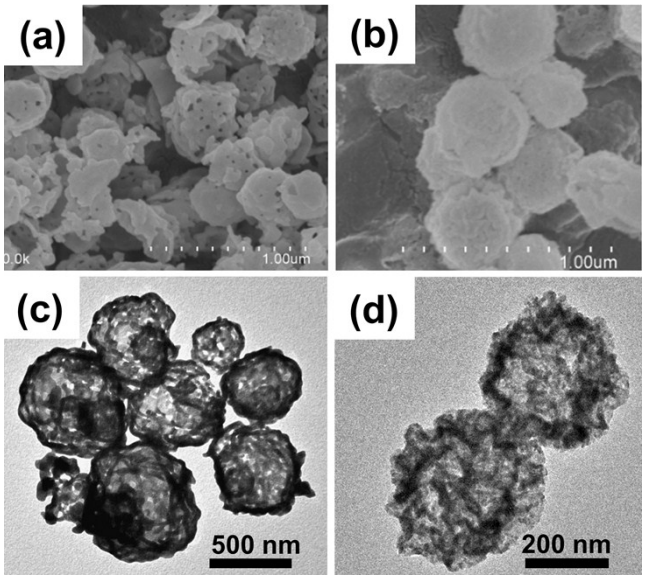

Figure S4 SEM and TEM images of (a, c) Mn_2O_3 and (b, d) CeO_2 hollow spheres at heat ramp rate of 5 °C min^{-1}.

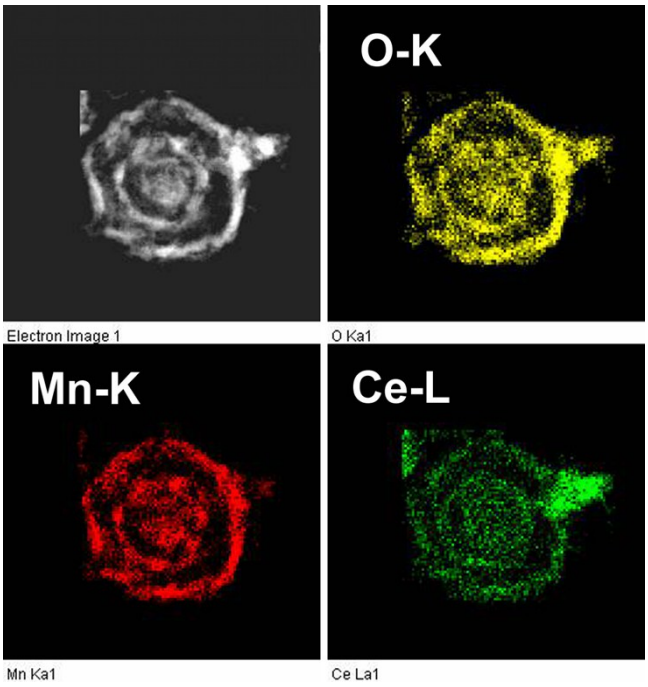

Figure S5 HAADF-STEM mapping images of one occasional triple-shell hollow sphere with non-dispersed particles.