

Supplementary information for:

## Large scale combustion synthesis of glass- $\gamma$ - $\text{Fe}_2\text{O}_3$ double shell composite hollow microspheres with tunable magnetic property

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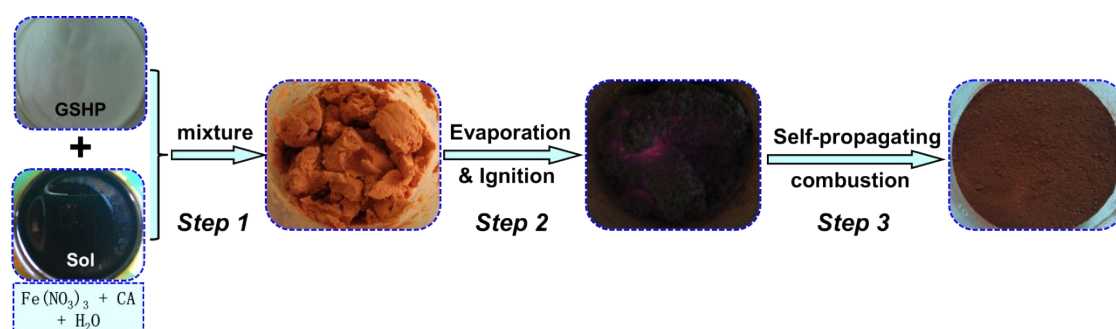


Fig. S1 Schematic illustration of the preparation process of the glass- $\gamma$ - $\text{Fe}_2\text{O}_3$  DSCHMs.

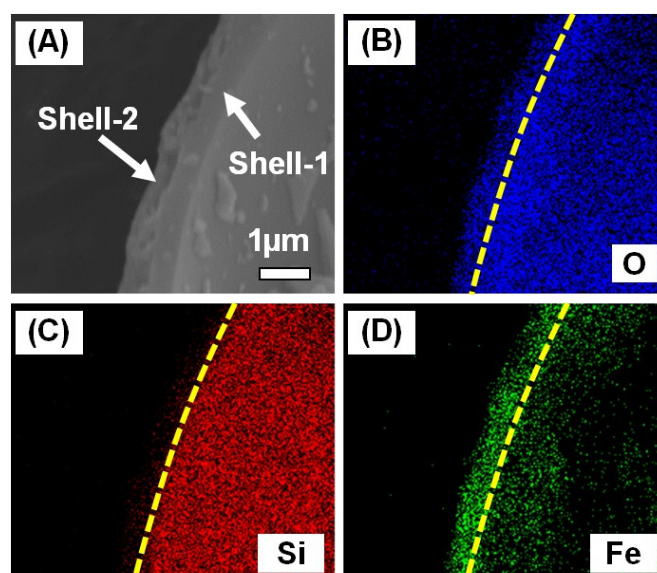


Fig. S2 SEM image (A) and the corresponding EDX element mapping of O (B), Si (C) and Fe (D) taken on a fragment of the as-obtained glass- $\gamma$ - $\text{Fe}_2\text{O}_3$  DSCHMs (sample S3).

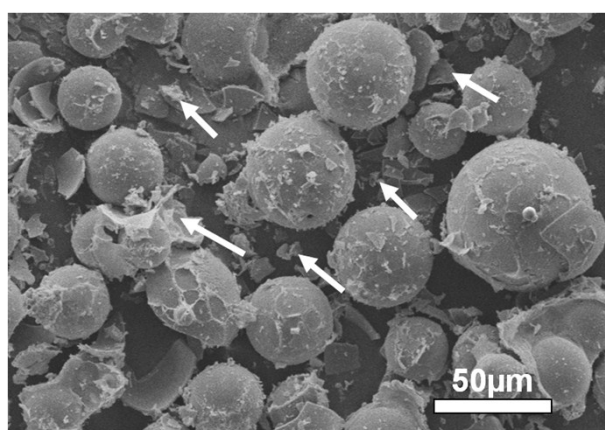


Fig. S3 SEM images of the as-obtained glass- $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> DSCHMs prepared using a precursor containing 2.0g SSHMs and 16g sol (sample S4).

With high sol content in the precursor, such as the case of sample S4, some isolated maghemite particles (not assembled on the SSHMs, marked by white arrows in the SEM image) were formed during the fast combustion reaction. Therefore, stepwise maghemite assembly with various reaction cycles was carried out using a precursor containing 2.0g SSHMs and 6g sol. To get DSCHMs with thicker shell, the preformed composite microspheres were used as starting material in the subsequent cycle to prepare the precursor mixture.

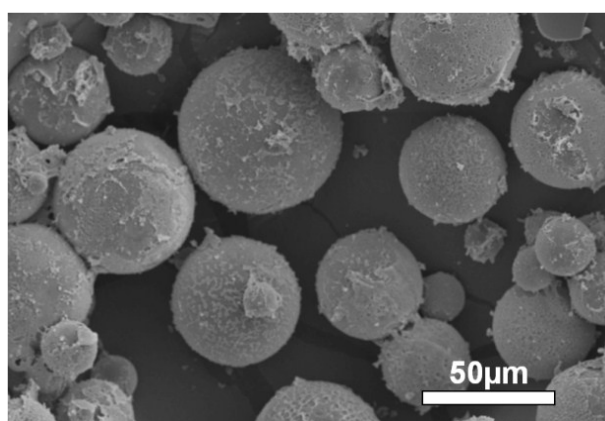


Fig. S4 SEM images of the as-obtained glass- $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> DSCHMs obtained after four cycles of maghemite assembly using a precursor containing 2.0g SSHMs and 6g sol (sample S8).

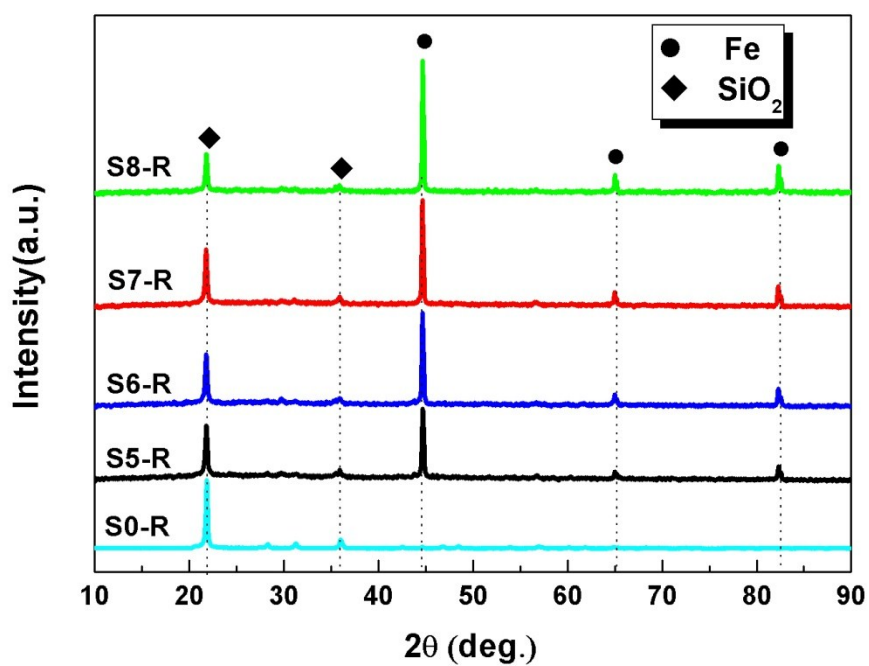


Fig. S5 XRD patterns of the SSHMs (S0) and the glass-Fe DSCHMs obtained by reduction of the glass- $\gamma$ - $\text{Fe}_2\text{O}_3$  DSCHMs.

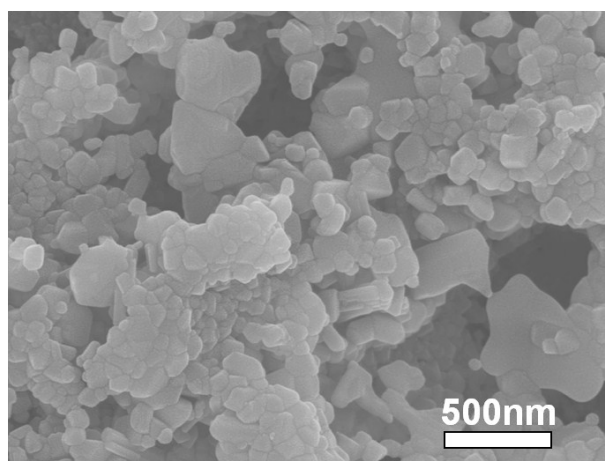


Fig. S6 SEM image taken on the surface of the glass-Fe DSCHMs obtained by reduction of the glass- $\gamma$ - $\text{Fe}_2\text{O}_3$  DSCHMs (S8-R).