

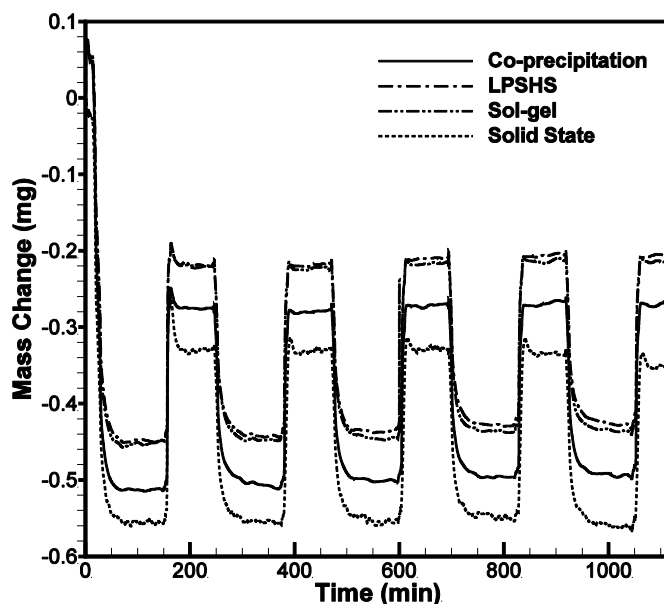
## Supplementary Material for:

# Effects of Dopant Metal Variation and Material Synthesis Method on the Material Properties of Mixed Metal Ferrites in Ytria Stabilized Zirconia for Solar Thermochemical Fuel Production

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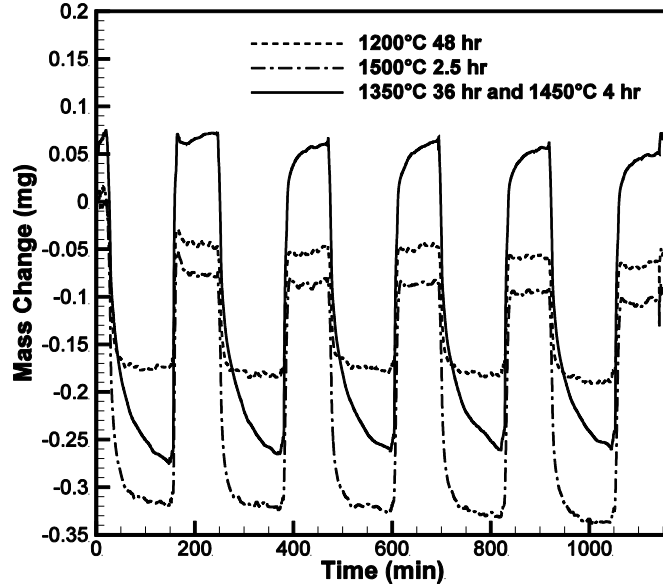
## TGA Data and XRD Analysis

Figure S1 shows the mass changes via thermogravimetric analysis during 5 cycles of oxidation and reduction in the two-step CO<sub>2</sub> splitting using the 10 wt.% MnFe<sub>2</sub>O<sub>4</sub> in 8YSZ samples prepared with four different synthesis methods.



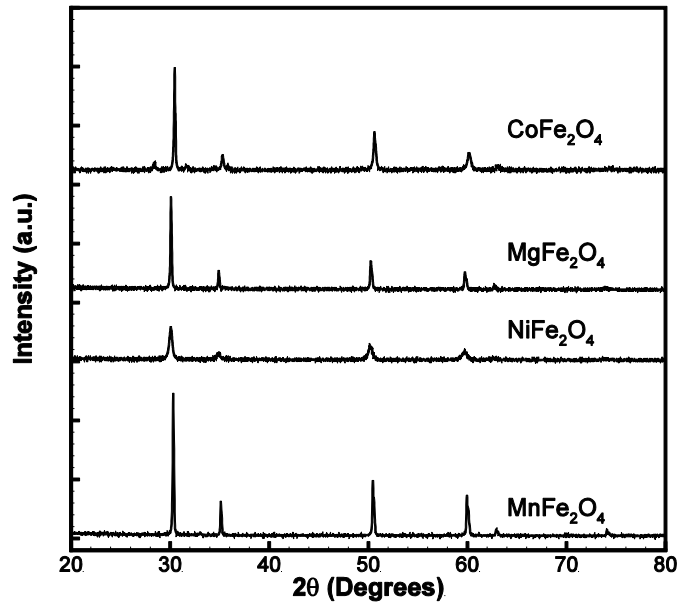
**Figure S1: TGA mass change for five cycles of the MnFe<sub>2</sub>O<sub>4</sub> samples prepared with different synthesis methods.**

Figure S2 shows the mass changes during 5 cycles of oxidation and reduction in the two-step CO<sub>2</sub> splitting using the 10 wt.% MnFe<sub>2</sub>O<sub>4</sub> in 8YSZ samples created via co-precipitation and with different calcination procedures.



**Figure S2: TGA mass change for five cycles of the co-precipitation  $\text{MnFe}_2\text{O}_4$  samples with different calcination procedures.**

Figure S3 displays the post calcination X-ray diffraction patterns for the four different metal ferrite samples with 10 wt.% in 8YSZ synthesized via co-precipitation.



**Figure S3: XDR results for the four mixed metal ferrite samples post calcination.**

Figure S4 shows the mass changes during 5 cycles of oxidation and reduction for the four different metal ferrite samples with 10 wt.% in 8YSZ synthesized via co-precipitation.

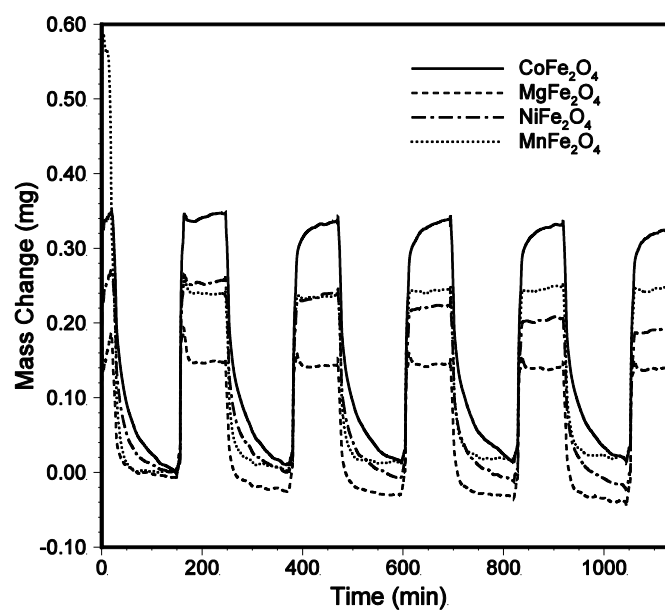


Figure S4: TGA mass change for five cycles of the four mixed metal ferrite samples.