

# Effects of Different Reductive Agents on Zn-Promoted Iron Oxide Phases in the CO<sub>2</sub>-Fischer-Tropsch to Linear $\alpha$ -Olefins

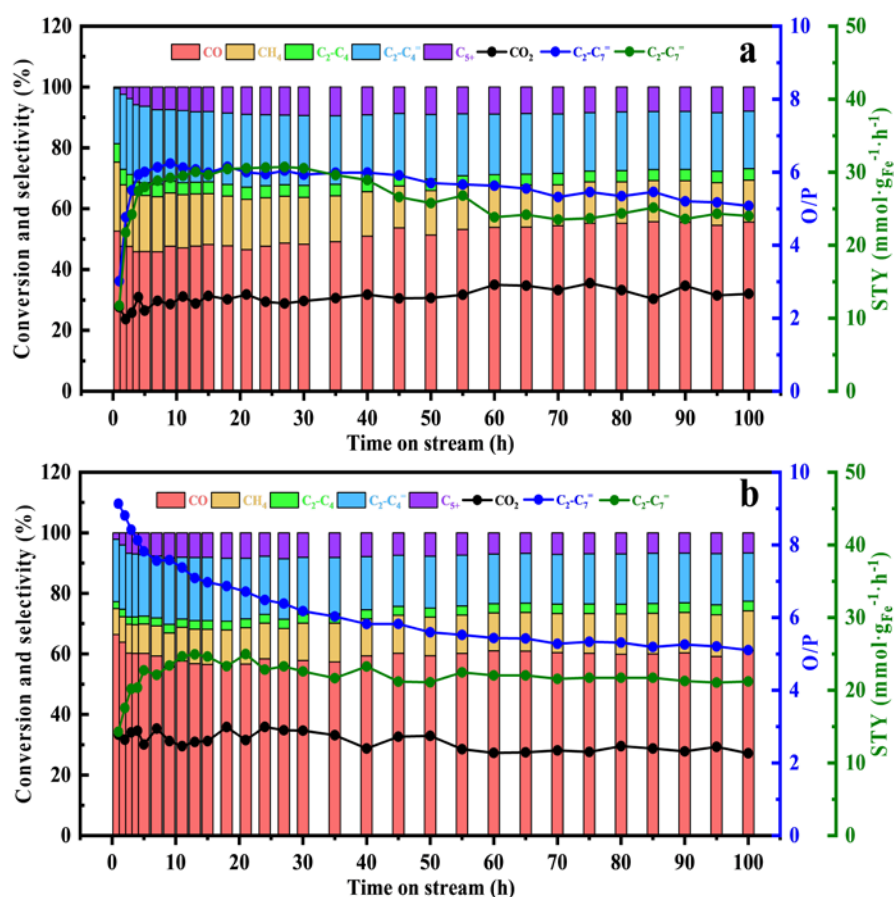
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and Yi-Fan Han <sup>1,3,\*</sup>

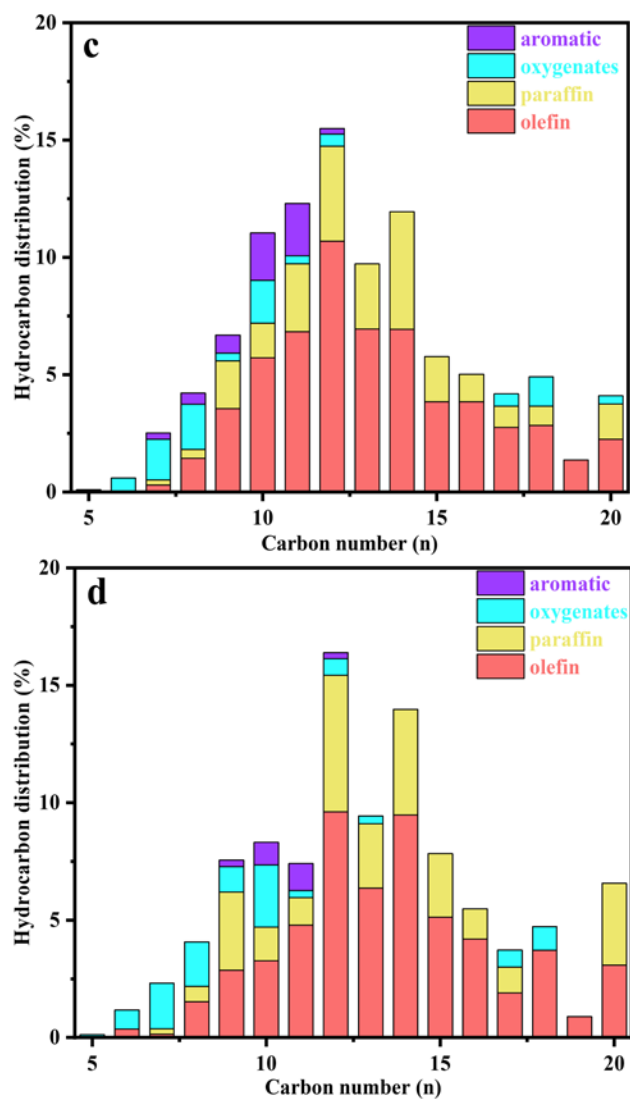
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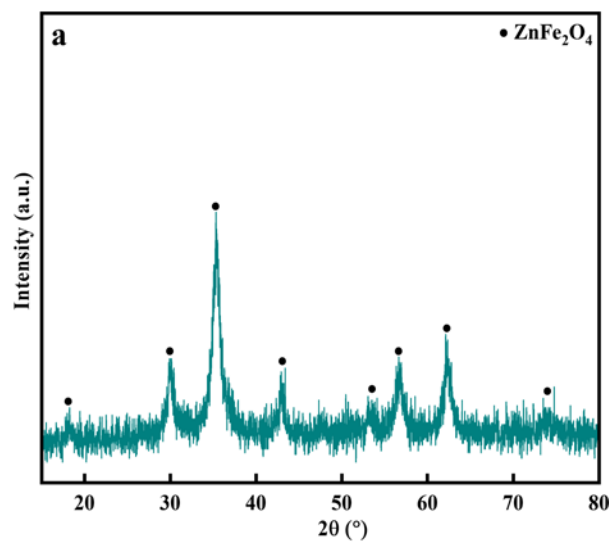
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**Figure S1.** 100 h time on stream of the Fe<sub>2</sub>Zn<sub>1</sub> activated by (a) 5%CO/5%H<sub>2</sub>/Ar and (b) 10%H<sub>2</sub>/Ar and 100 h liquid product analysis of the Fe<sub>2</sub>Zn<sub>1</sub> activated by (c) 5%CO/5%H<sub>2</sub>/Ar and (d) 10%H<sub>2</sub>/Ar under reaction conditions (330 °C, 1.5 MPa, 60, 000 mL•g<sup>-1</sup>•h<sup>-1</sup>).



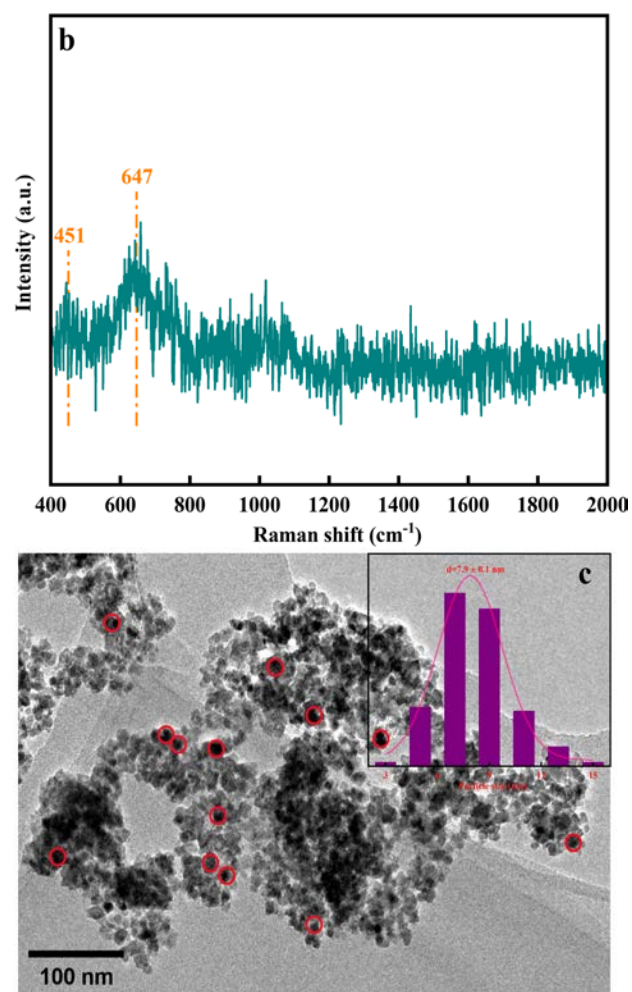


Figure S2. (a) XRD, (b) Raman, and (c) TEM of the fresh catalyst.

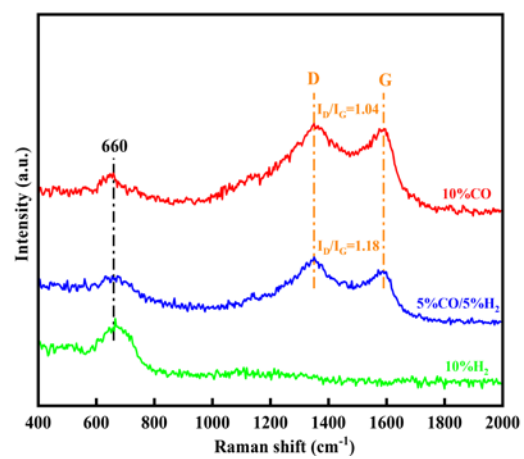
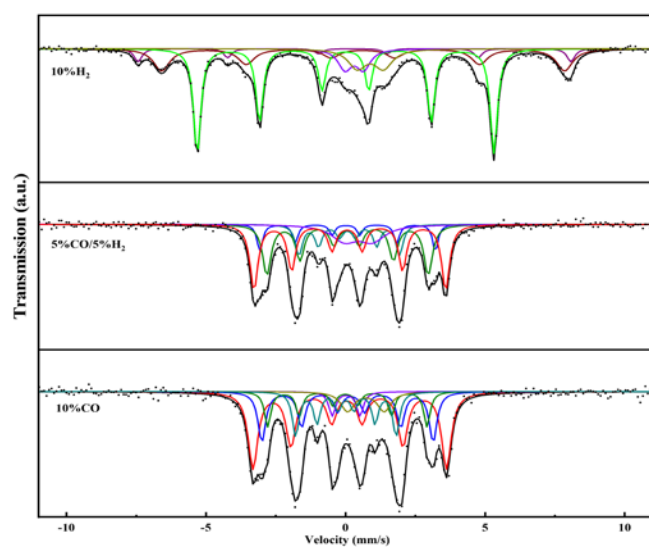
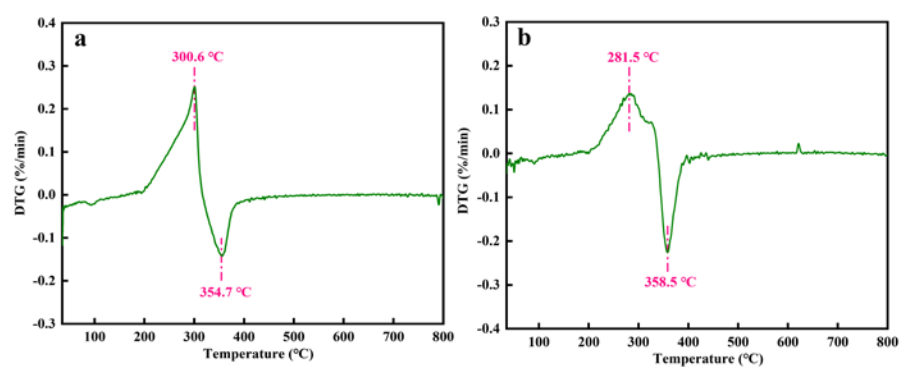


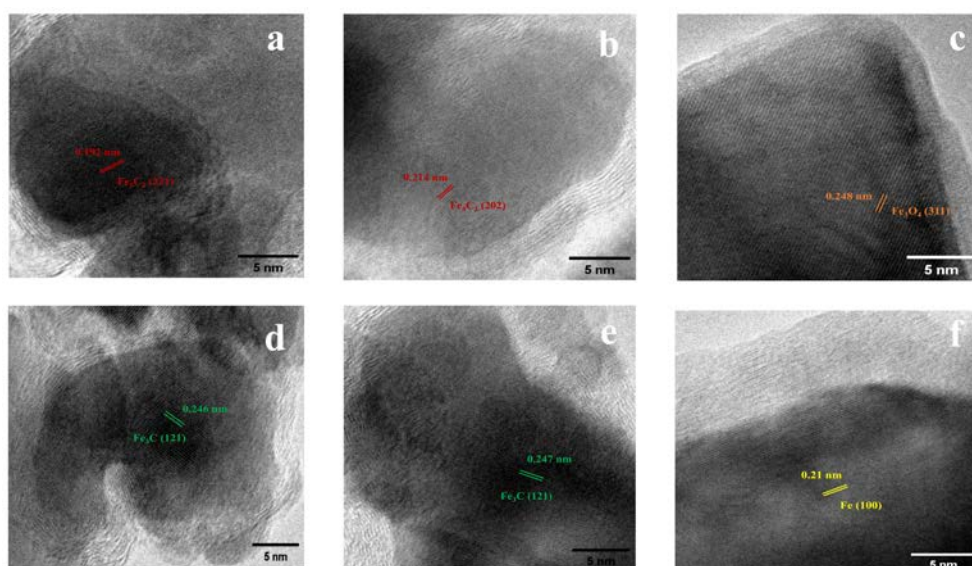
Figure S3. Raman of the activated catalysts.



**Figure S4.** Moössbauer spectra of the activated catalysts.



**Figure S5.** DTG curves of the (a) 10%CO- and (b) 5%CO/5%H<sub>2</sub>-activated catalysts.



**Figure S6.** HRTEM images of the (a and d) 10%CO-, (b and e) 5%CO/5%H<sub>2</sub>-, (c and f) 10%H<sub>2</sub>-activated catalysts.

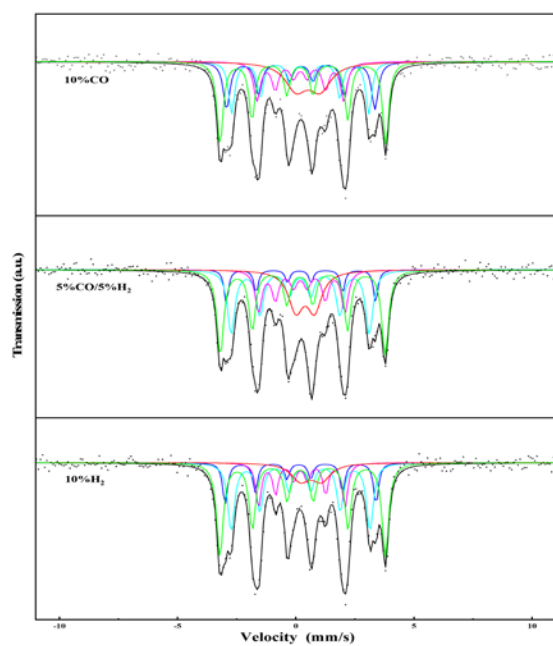
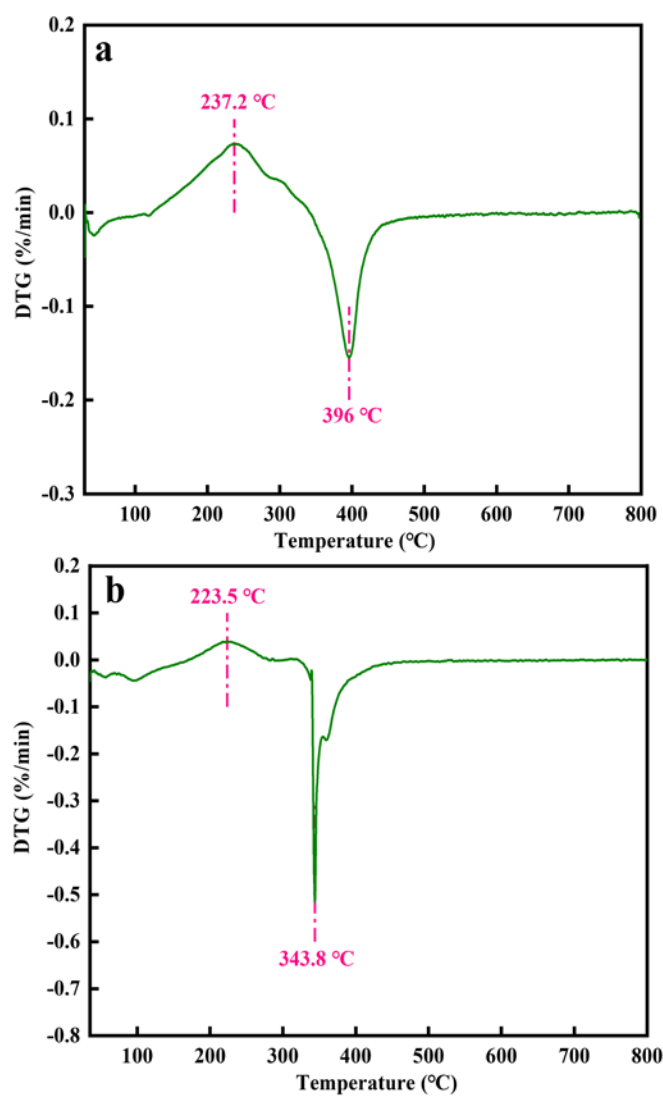


Figure S7.  $^{55}\text{Mo}$  Mossbauer spectra of the spent catalysts.



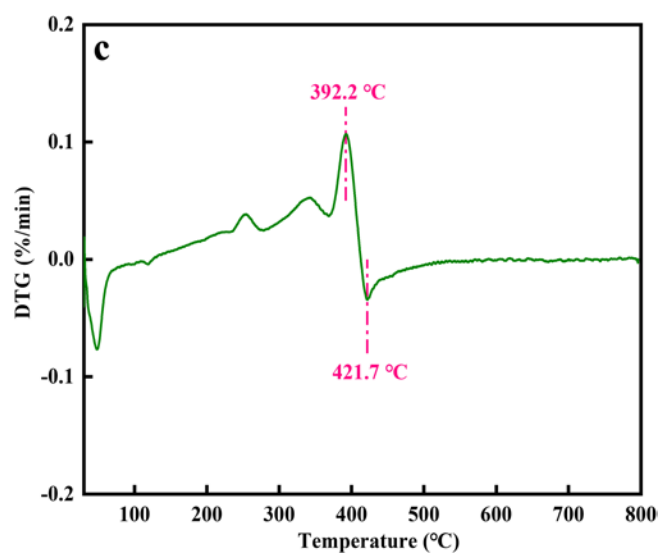


Figure S8. DTG curves of the spent catalysts of (a) 10%CO-, (b) 5%CO/5%H<sub>2</sub>- and (c) 10%H<sub>2</sub>-pretreated.

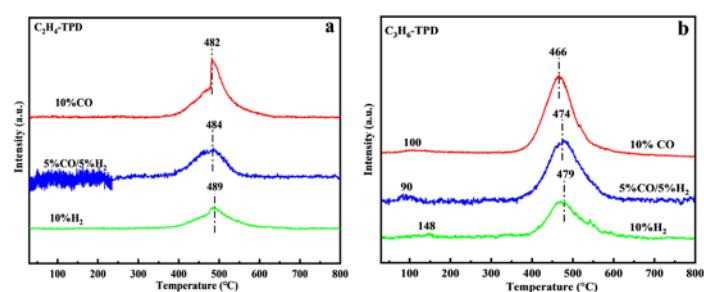


Figure S9. (a) C<sub>2</sub>H<sub>4</sub>-TPD and (b) C<sub>3</sub>H<sub>6</sub>-TPD of the spent catalysts.

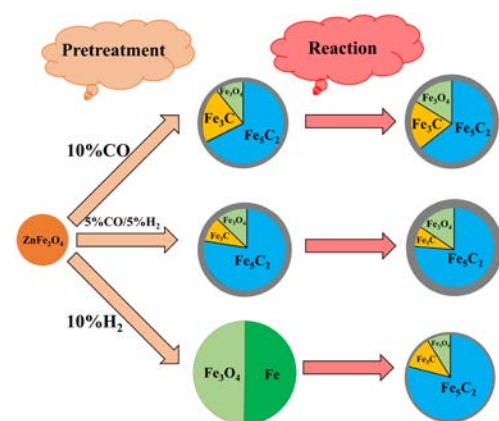
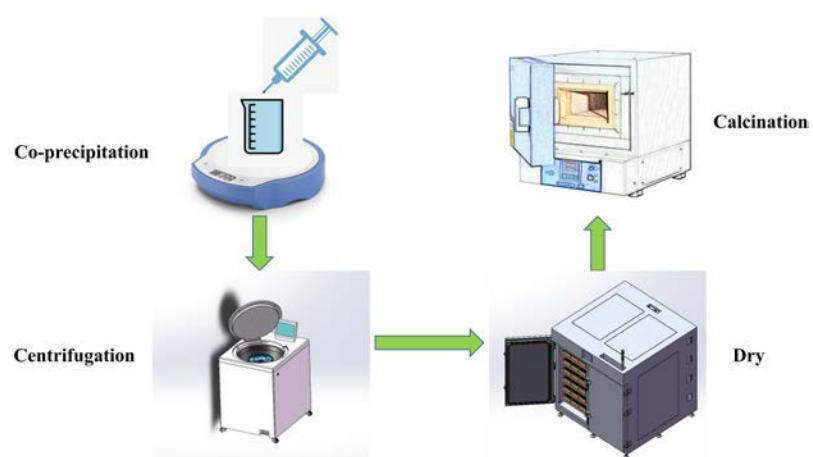


Figure S10. Structural and phase composition of the catalyst after pretreatment and reaction.



**Figure S11.** Schematic representation of the catalysts preparation.