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## *Supplementary Information*

# UiO-66 MOF-Derived Ru@ZrO<sub>2</sub> Catalysts for Photo-Thermal CO<sub>2</sub> Hydrogenation

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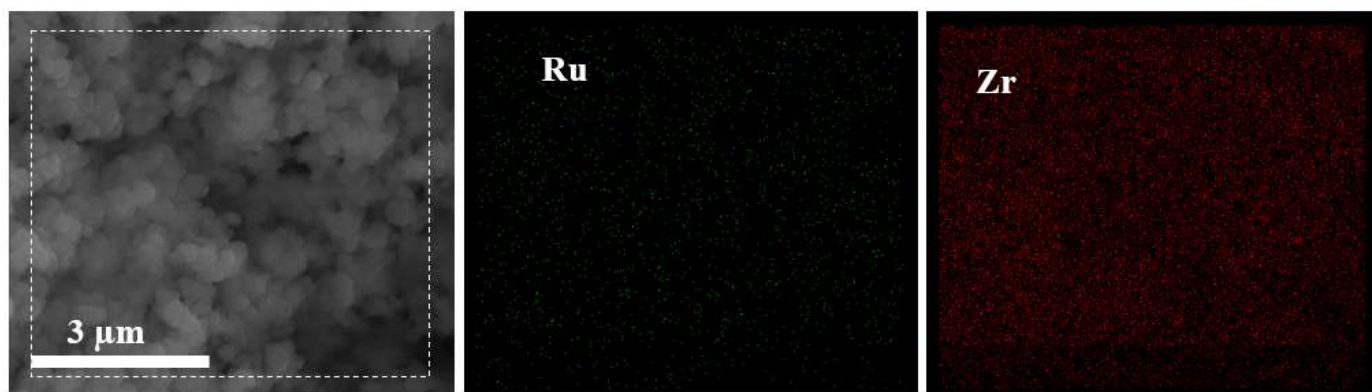
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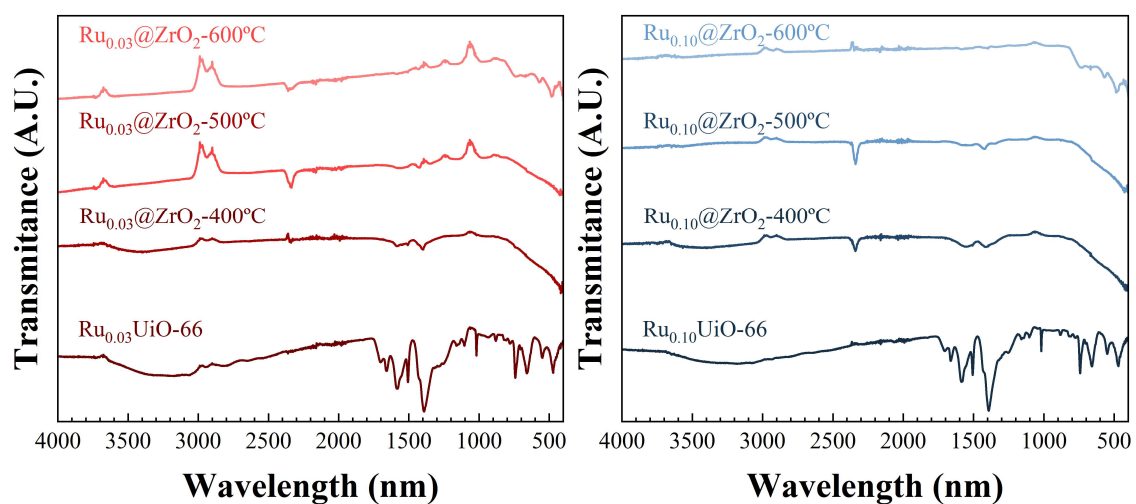
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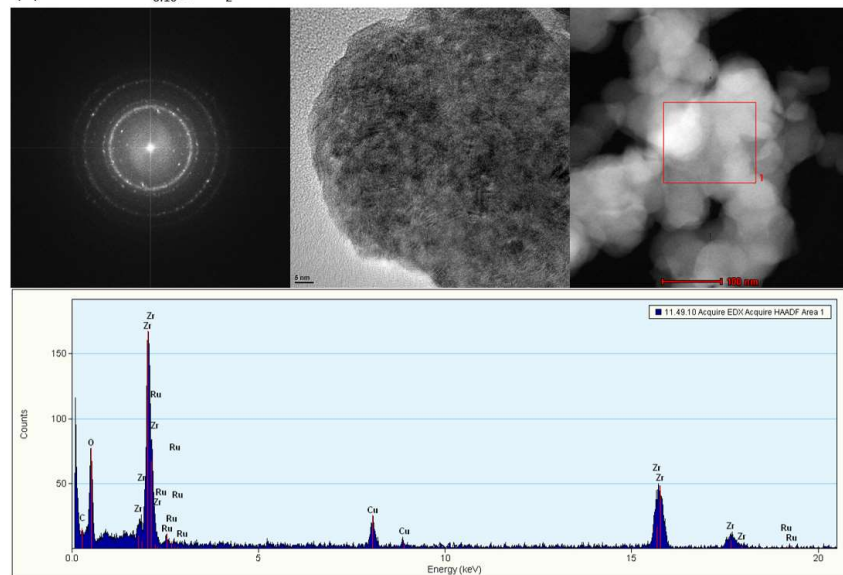


**Figure S1.** SEM image and EDX analysis map of Ru<sub>0.10</sub>UiO-66 MOF.

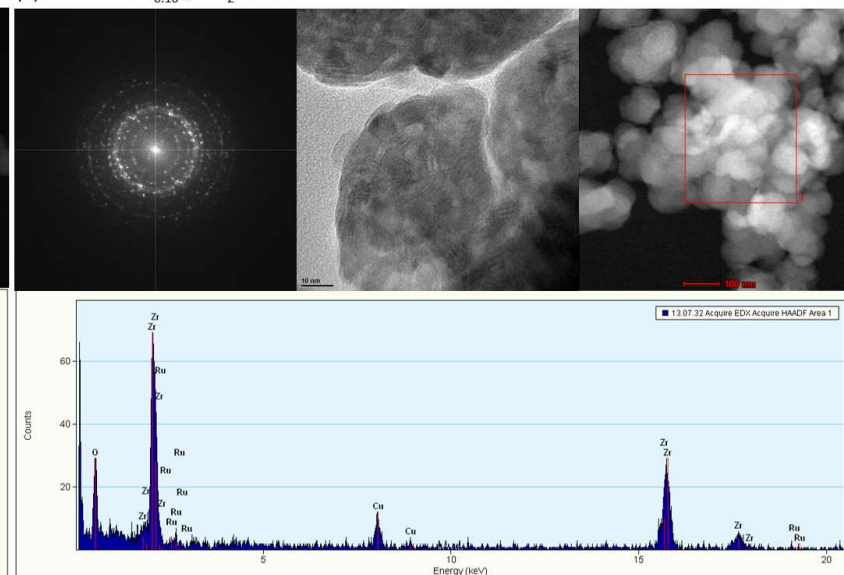


**Figure S2.** FTIR spectra of the Ru-loaded UiO-66 (Ru<sub>x</sub>UiO-66) and the Ru<sub>x</sub>@ZrO<sub>2</sub> catalysts obtained after calcination at 400, 500 and 600 °C.

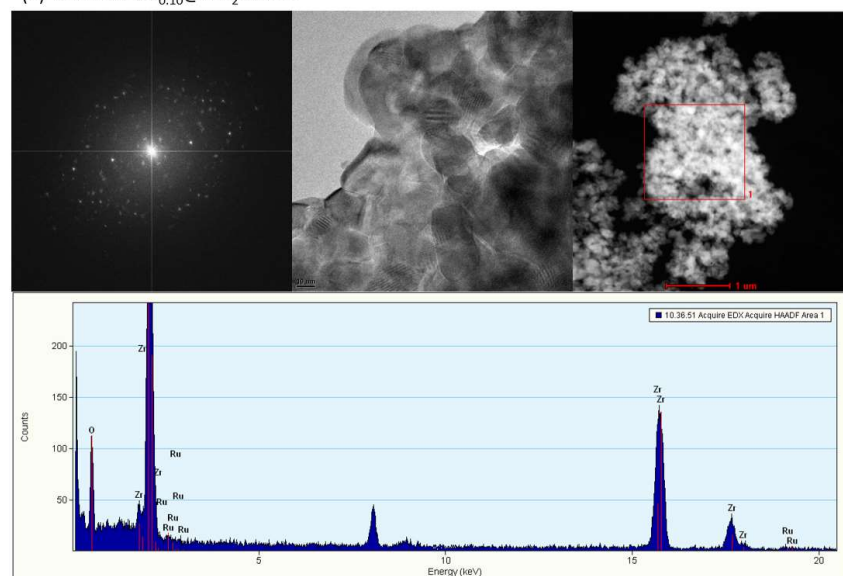
(A) TEM-EDX: Ru<sub>0.10</sub>@ZrO<sub>2</sub>-400°C



(B) TEM-EDX: Ru<sub>0.10</sub>@ZrO<sub>2</sub>-500°C



(C) TEM-EDX: Ru<sub>0.10</sub>@ZrO<sub>2</sub>-600°C



(D) TEM-EDX: Ru<sub>0.03</sub>@ZrO<sub>2</sub>-600°C

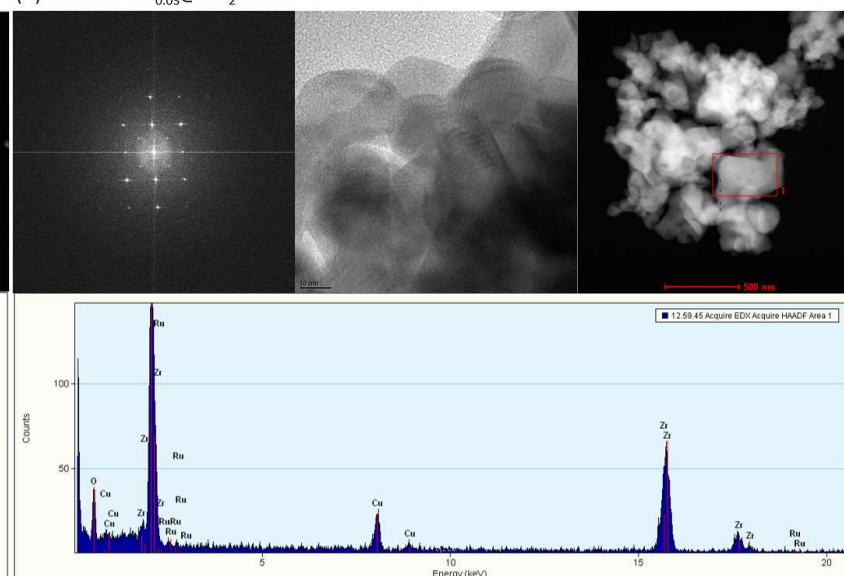


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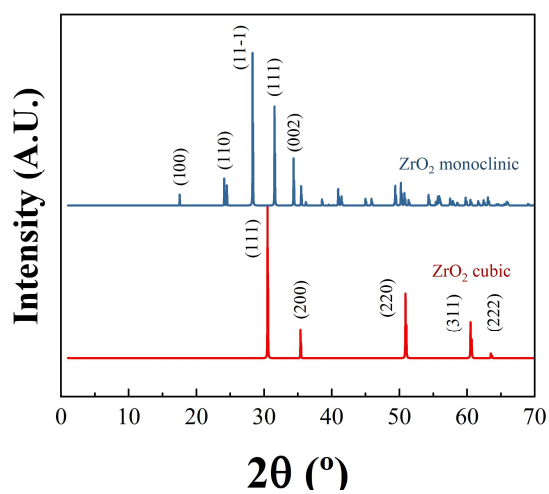


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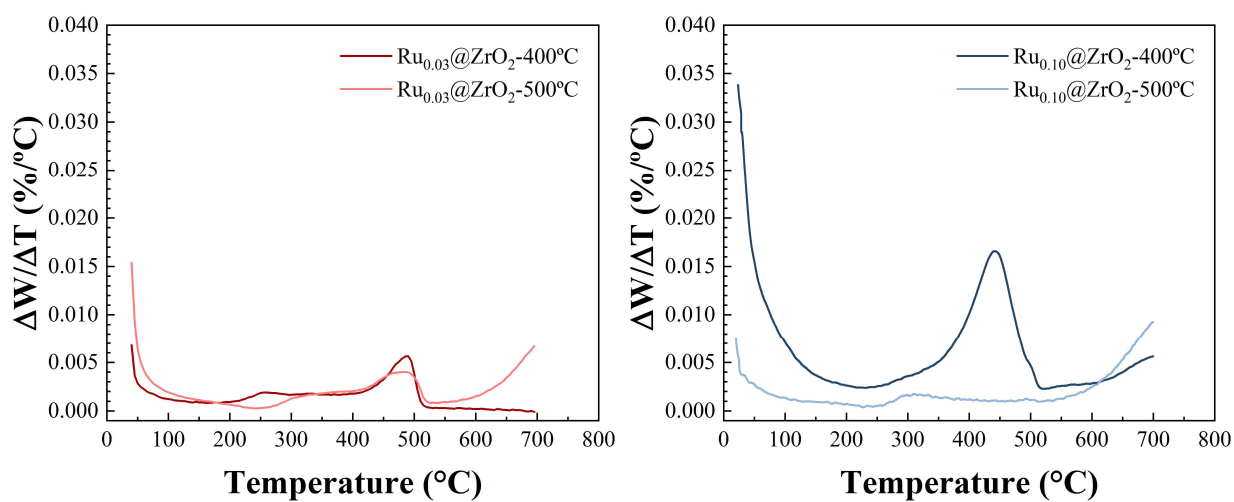


Figure S5: Derivative TGA curves of the Ru<sub>x</sub>@ZrO<sub>2</sub> catalysts calcined at 400 and 500 °C.

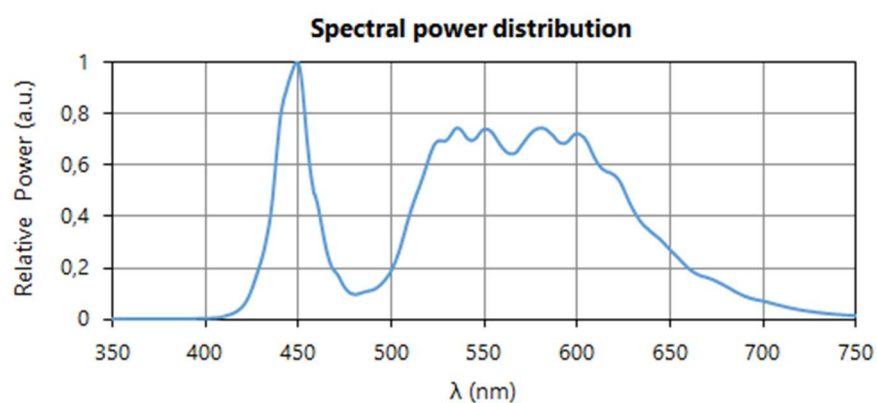


Figure S6: Spectral power distribution of ultra-high power LEDM-5500 White HP - Pyroistech S.L.