

## **Supplementary Information**

# **Study on the Hydrogenation of Ethyl Stearate to the Fatty Alcohol 1-Octadecanol over Ru on Tungstated Zirconia**

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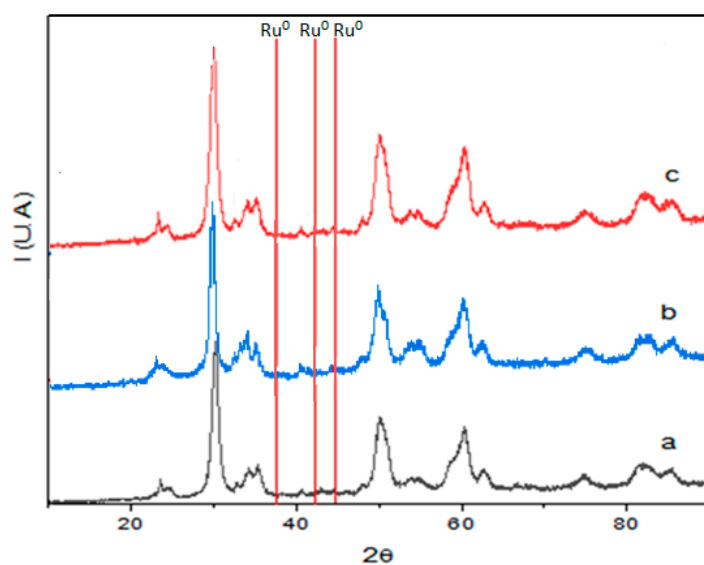
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#### **Characterization of metal-based catalysts and supports**

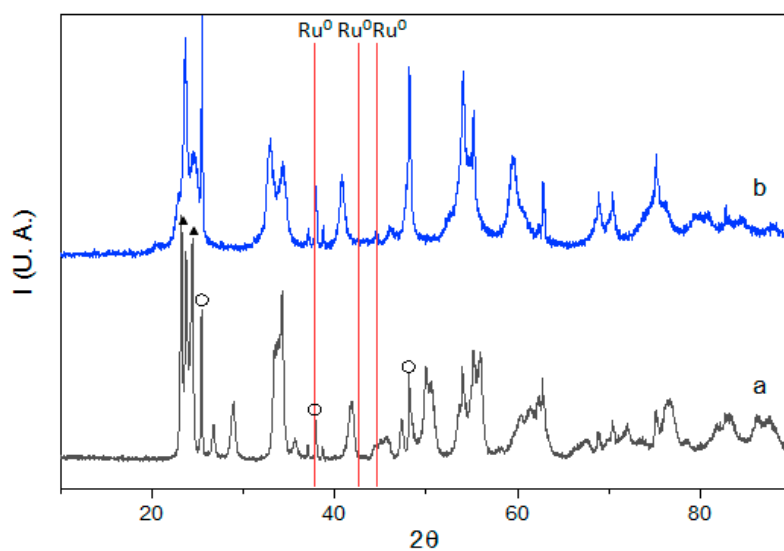
*S1. X-ray powder diffraction (XRPD) analysis.*

*S2. Transmission Electron Microscopy (TEM)*

*S1. X-ray powder diffraction (XRPD) analysis*



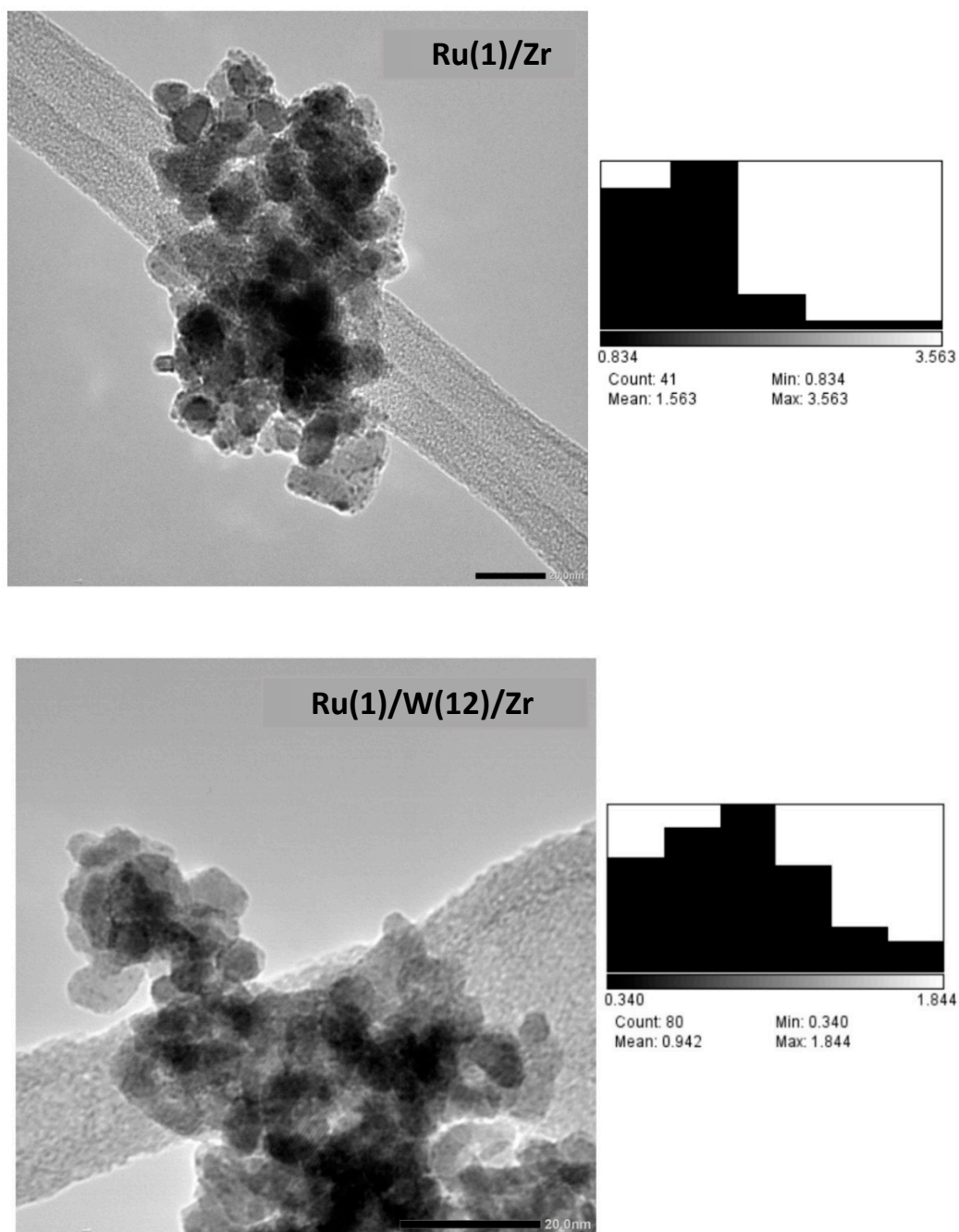
**Figure S1** XRP diffractograms obtained for W/Zr mixed oxides with increasing amounts of Ru: a) Ru(0.5)/W(33)/ Zr, b) Ru(1.3)/W(33)/Zr and c) Ru(2)/W(33)/Zr.



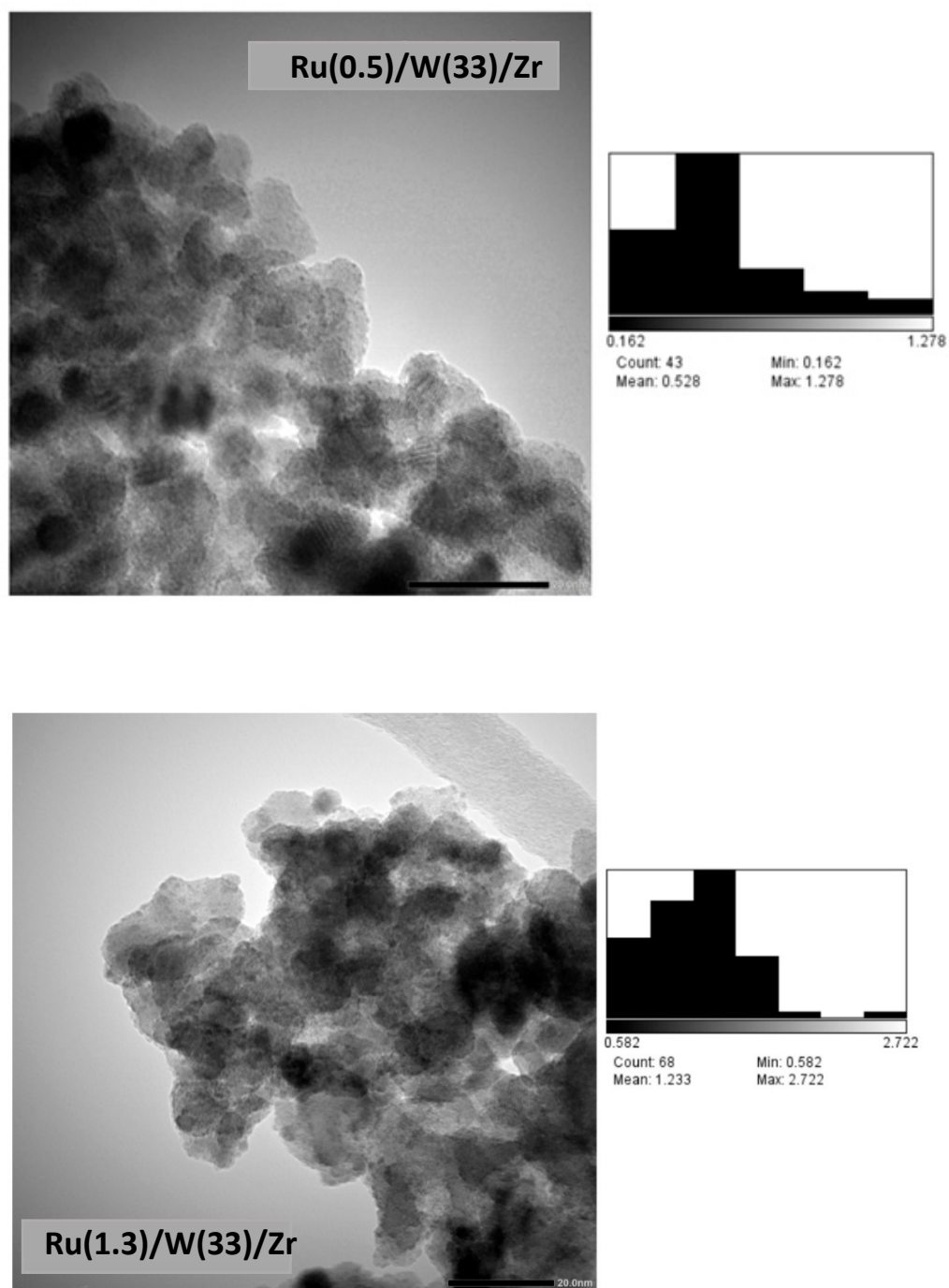
**Figure S2** XRP diffractograms of mixed oxide W/Ti and Ru-doped W/Ti mixed oxide: a) W(30)/Ti, b) Ru(1)/W(30)/Ti. (W: (▲) and  $\text{TiO}_2$  Anatase (○)).

## S2. *Transmission Electron Microscopy (TEM)*

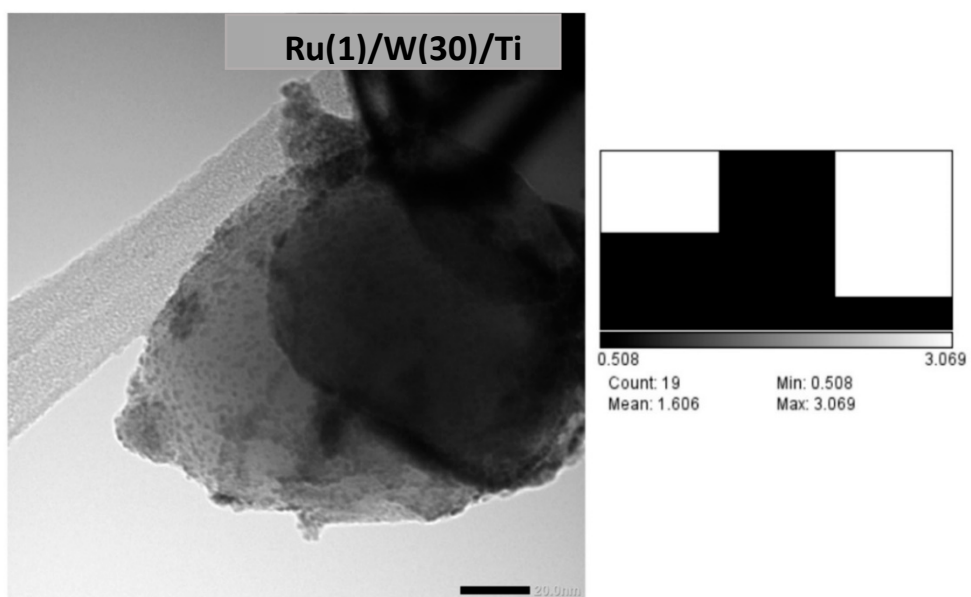
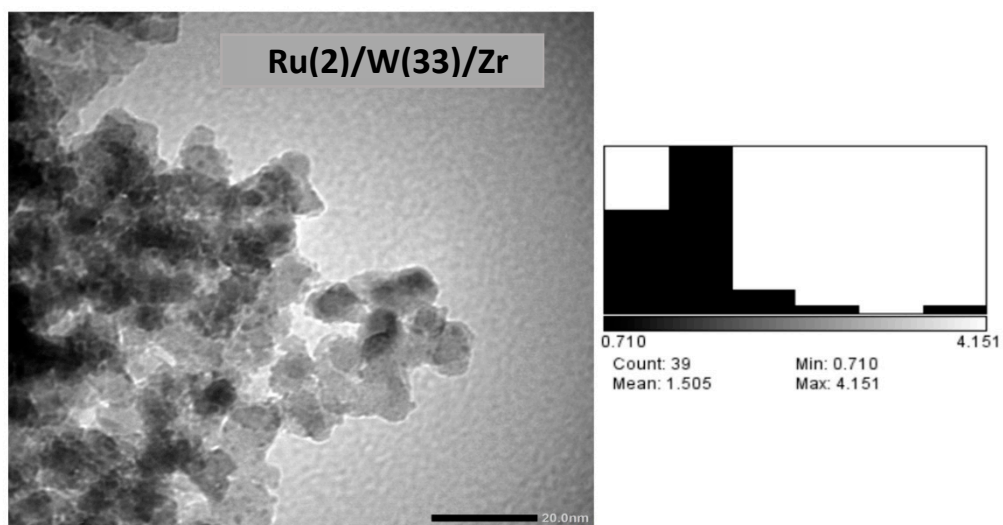
Transmission electron microscopy (TEM) was carried out to analyze the shape, and size of ruthenium and tungsten nanoparticles on zirconia and titania. Figures 3S-5S show TEM images obtained for representative as-prepared Ru-based catalysts. The average particle size ranged between 0,9-1.6 nm.



**Figure S3** TEM micrographs of the catalysts Ru(1)/Zr and Ru(1)/W(12)/Zr, with their average particle diameter (mean), minimum and maximum particle diameter.



**Figure S4** TEM micrographs of the catalysts Ru(0,5)/W(33)/Zr and Ru(1.3)/W(33)/Zr with their average particle diameter (mean), minimum and maximum particle diameter.



**Figure S5** TEM micrographs of the catalysts Ru(2)/W(33)/Zr and Ru(1)/W(30)/Ti and their average particle diameter (mean), minimum and maximum particle diameter.