

**Unraveling the effect of ZrO₂ modifiers on the nature of active sites on AuRu/ZrO₂ catalysts
for furfural hydrogenation**

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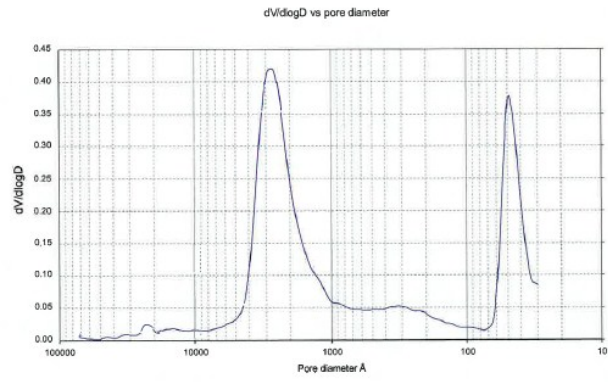
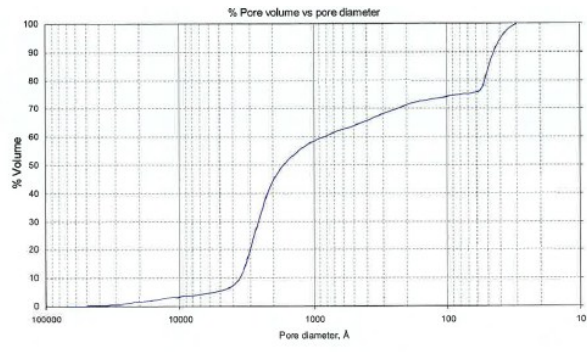
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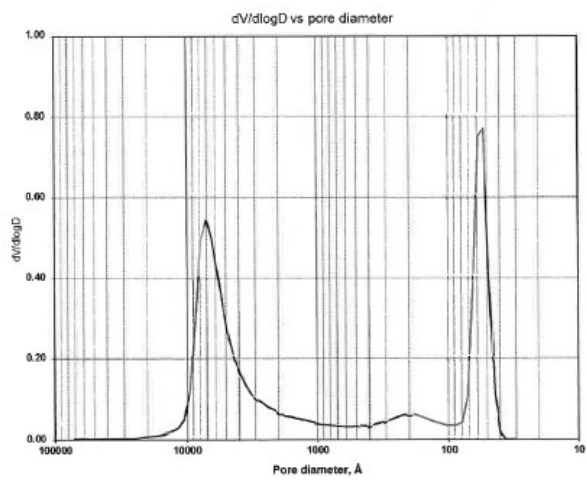
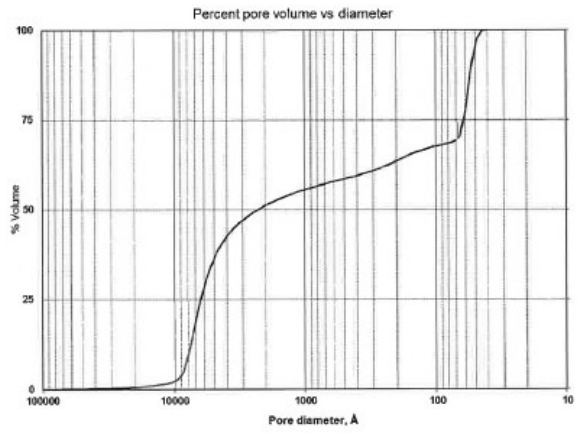
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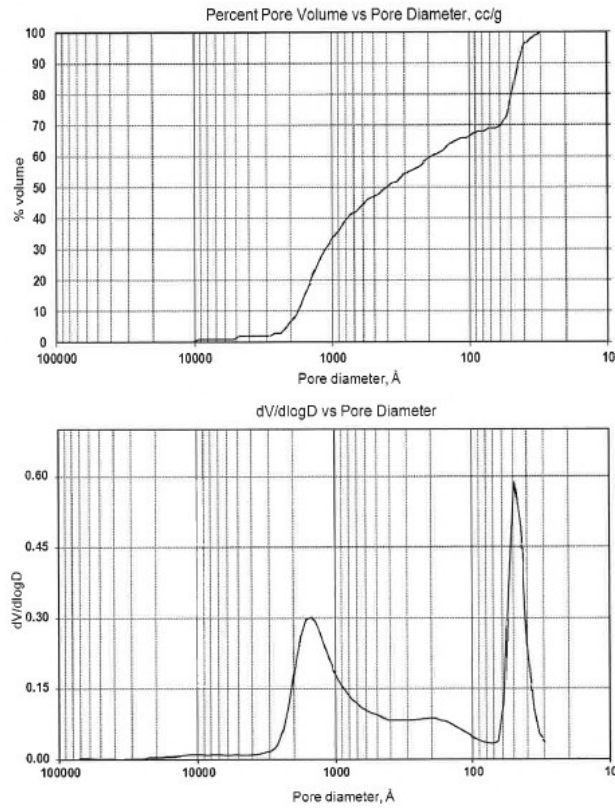
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a)



b)



c)

Figure SI-1. Pore size distributions and pore volumes for a) ZrO₂, b) Y-ZrO₂ and c) La-ZrO₂.

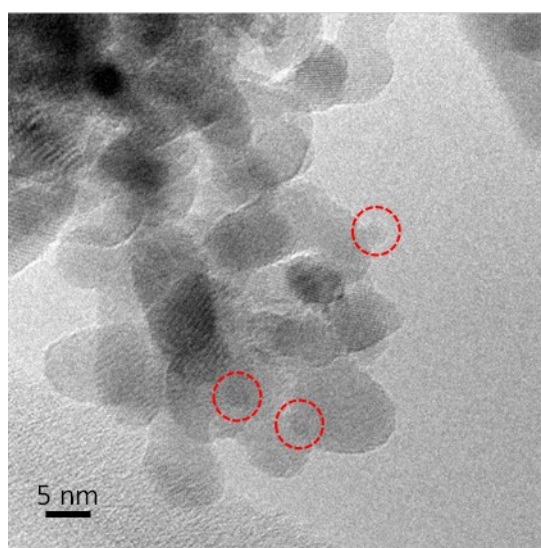
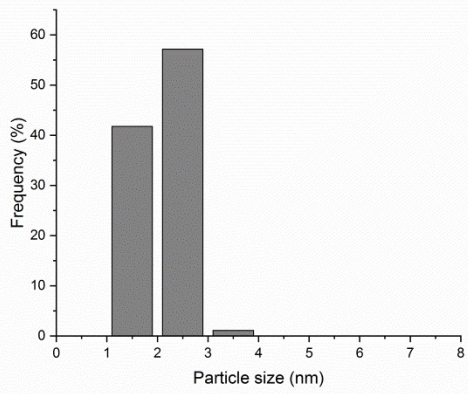
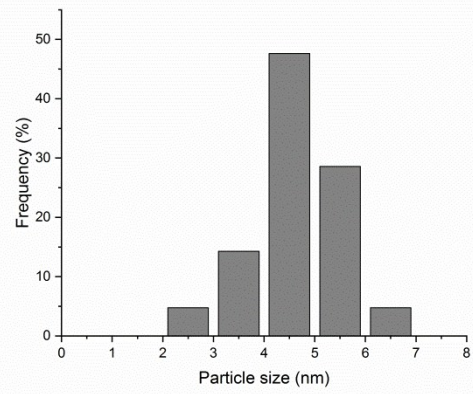


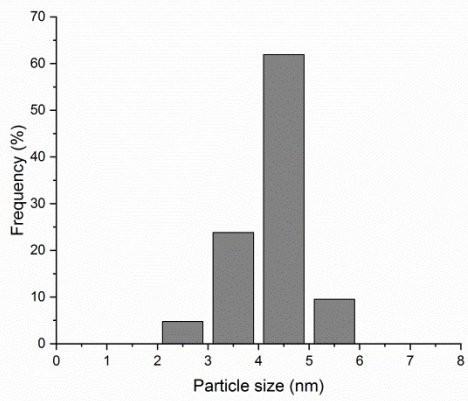
Figure SI-2. HRTEM image of the Ru/ZrO₂ catalyst, where the Ru nanoparticles are highlighted by circles



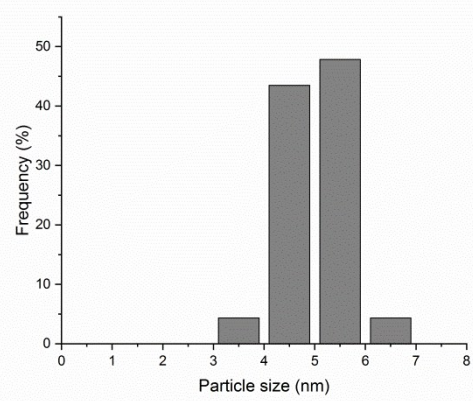
a)



b)



c)



d)

Figure SI-3 Particle size distribution for a) Ru/ZrO₂, b) AuRu/ZrO₂, c) AuRu/Y-ZrO₂ and d) AuRu/La-ZrO₂

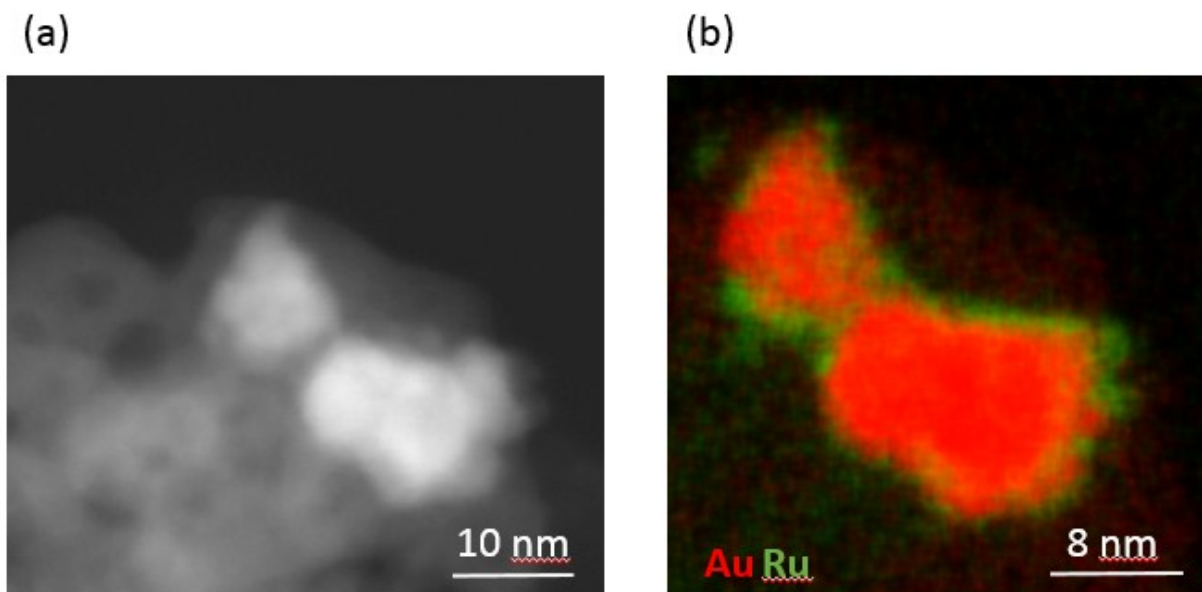


Figure SI-4. HAADF-STEM image of the AuRu/Y-ZrO₂ sample (section a) and quantified EDXS mapping (section b, Au,(red and Ru,green), showing the Ru NPs sitting on top of the Au NP.

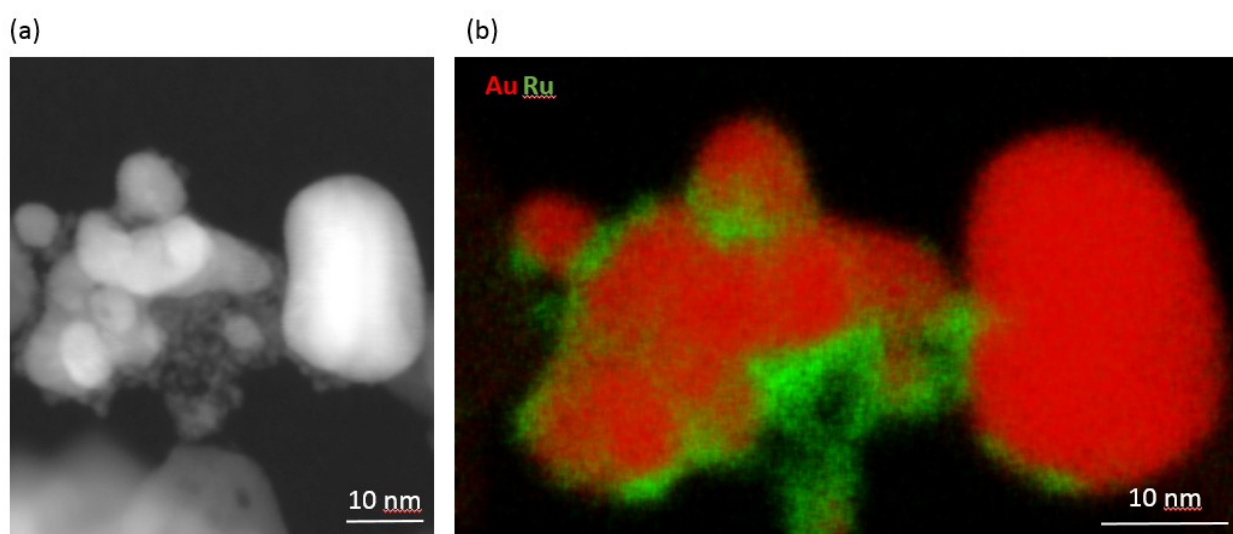


Figure SI-5. HAADF-STEM image of the AuRu/La-ZrO₂ sample (section a) and quantified EDXS mapping (section b, Au,(red and Ru,green), showing the Ru NPs sitting on top of the Au NP.

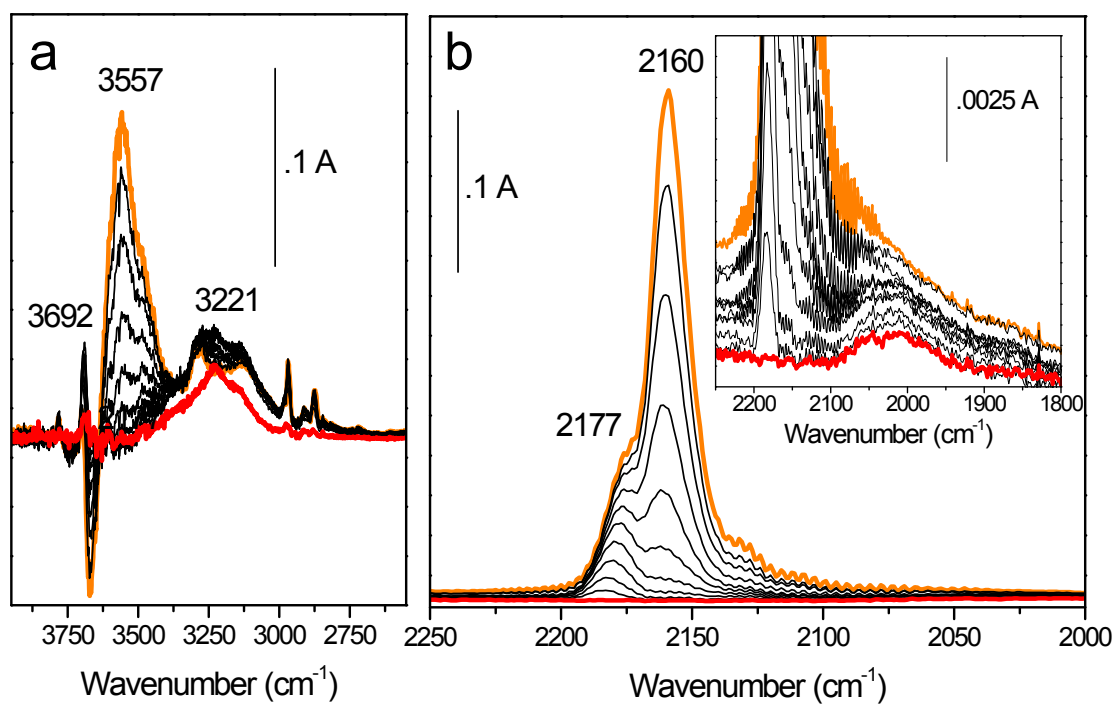


Figure SI-6. FTIR difference spectra collected on the Ru/ZrO₂ catalyst upon the inlet of 4 mbar CO at LNT (orange curve) and at decreasing CO pressures (black curves up to the red one) in the OH stretching region (section a) and in the carbonylic region (section b). Inset: zoom on the component at 2000-2050 cm^{-1} .