

## -Supplementary material-

### Temperature-dependent activity of gold nano-catalysts supported on activated carbon in redox catalytic reactions: 5-hydroxymethylfurfural oxidation and 4-nitrophenol reduction comparison

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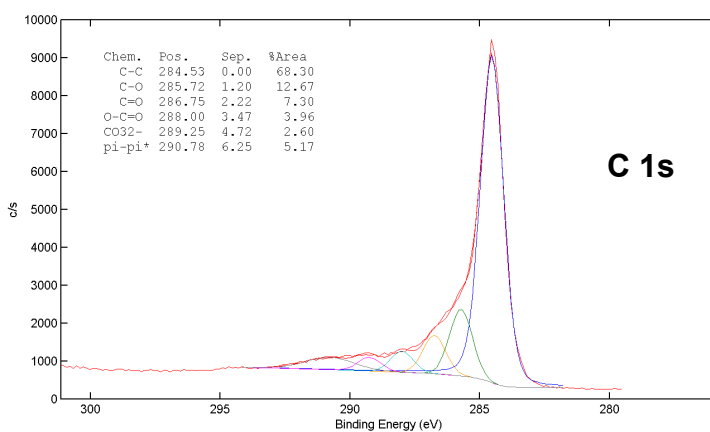
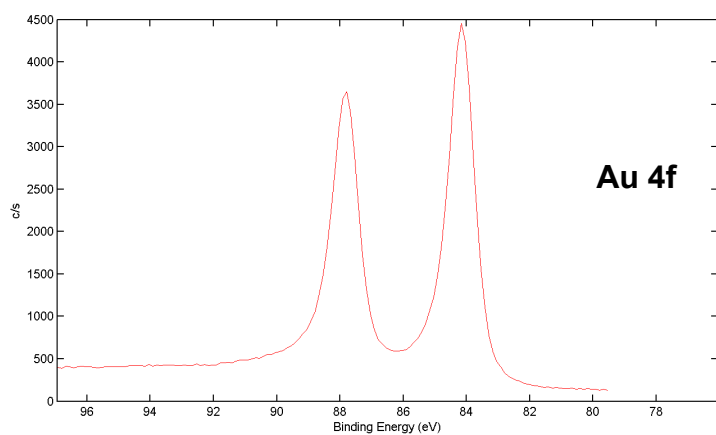
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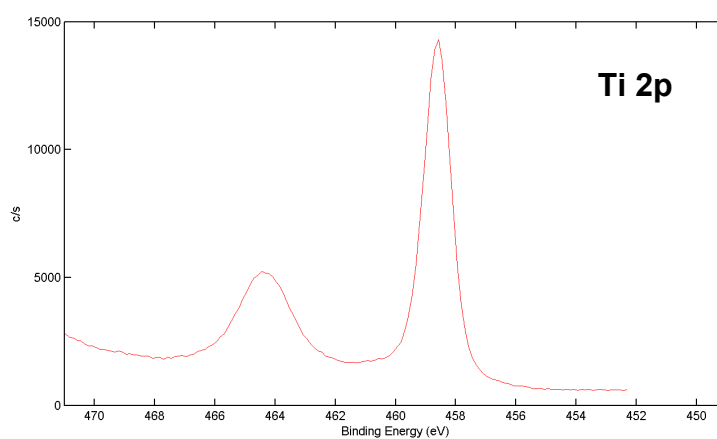
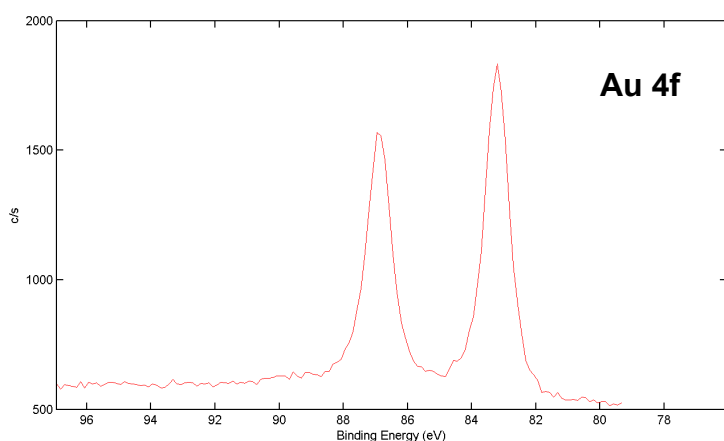
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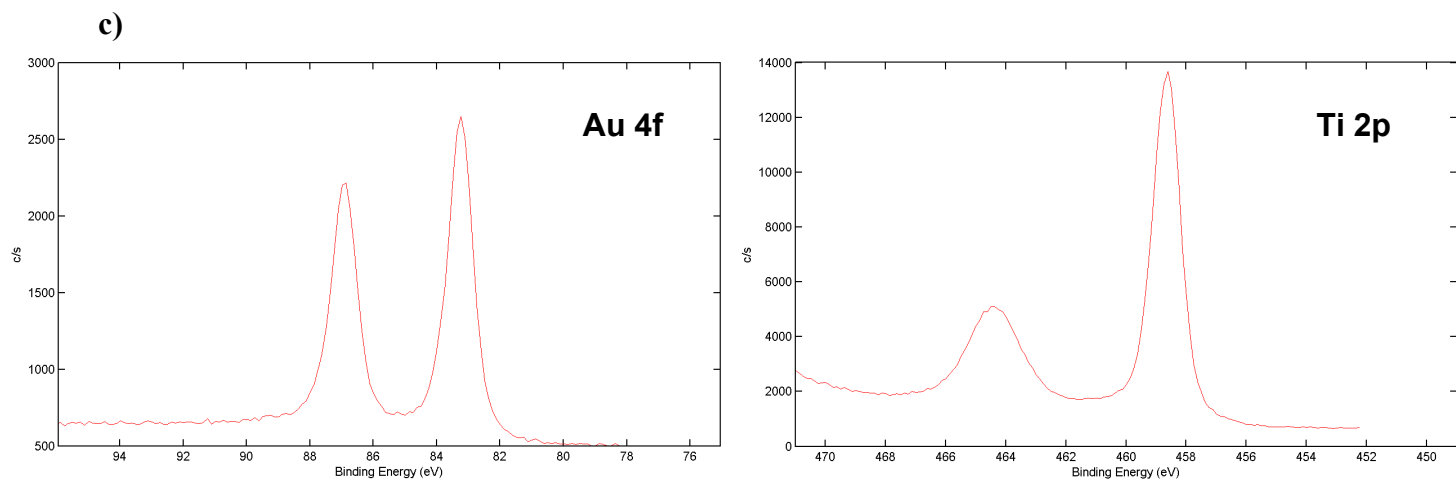
### X-ray photoelectron spectroscopy (XPS)

a)



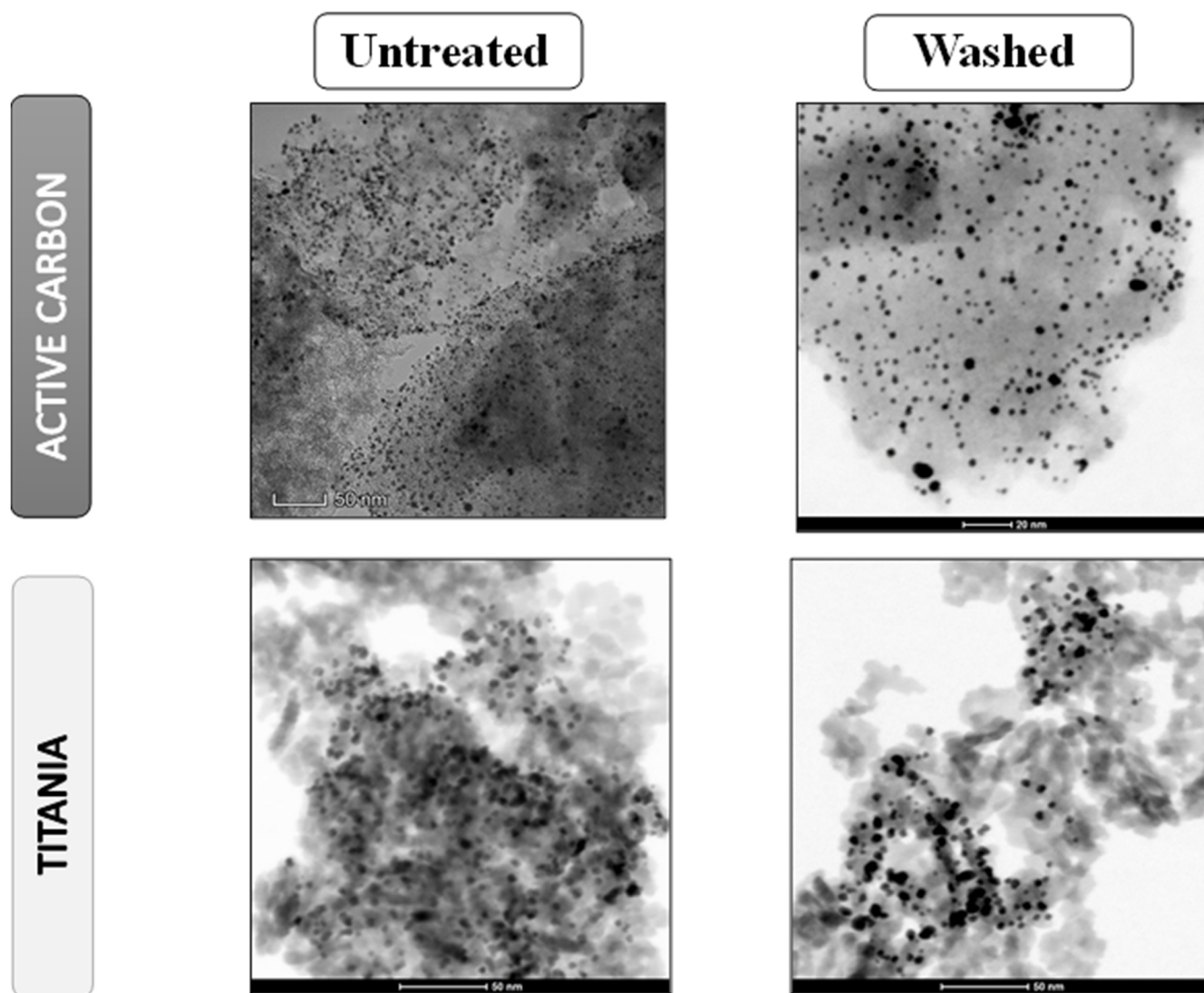
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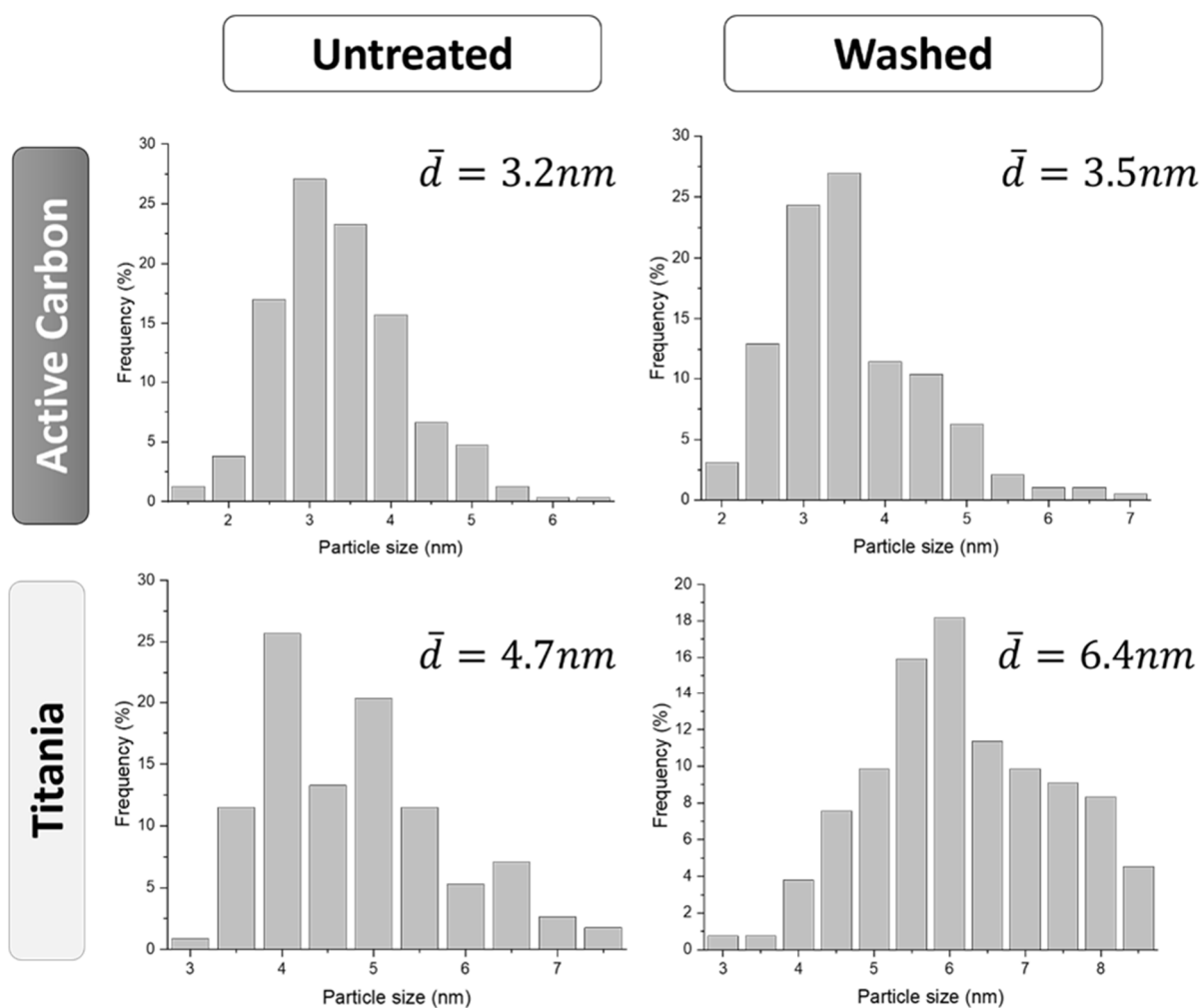


**Figure S1.** XPS spectra for Au/AC\_PVA-99-washed (a), Au/TiO<sub>2</sub>\_PVA-99 (b) and Au/TiO<sub>2</sub>\_PVA-99-washed (c).

## Transmission Electron Microscopy



**Figure S2.** TEM images of treated and untreated catalysts supported on active carbon and titania.



**Figure S3.** Particles size distribution of treated and untreated catalysts supported on active carbon and titania.

**Table S1.** Catalytic results on the HMF oxidation reaction.

Reaction conditions: T=70 °C, t=4h, P=10 bar O<sub>2</sub>, molar ratios HMF: Au: NaOH=1:0.01:4.

Sample	PVA HD (%)	X HMF (%)	S HMFCA (%)	S FFCA (%)	S FDCA (%)
Au/AC_PVA-20	20	100	48	1	51
Au/AC_PVA-40	40	100	29	0	71
Au/AC_PVA-50	50	100	20	0	80
Au/AC_PVA-60	60	100	25	0	75
Au/AC_PVA-88	88	100	32	0	68
Au/AC_PVA-99	99	100	31	0	69

**Table S2.** Kinetic parameters (apparent rate constant and conversion) for the 4-nitrophenol reduction related to catalysts prepared using PVA with different hydrolysis degree.

Sample	PVA (%)	HD	TEM Ø (nm)	Surface (at%)	Au	k <sub>app</sub> (min <sup>-1</sup> )	X%
Au/AC_PVA-20	20		9.6	0.86		$1.4 \cdot 10^{-3} \pm 2 \cdot 10^{-4}$	14±1
Au/AC_PVA-40	40		4.3	1.33		$6.3 \cdot 10^{-2} \pm 9 \cdot 10^{-3}$	97±1
Au/AC_PVA-50	50		4.2	1.72		$0.1 \pm 4 \cdot 10^{-3}$	99±0.4
Au/AC_PVA-60	60		3.9	3.34		$0.2 \pm 4 \cdot 10^{-2}$	99±1
Au/AC_PVA-88	88		3.4	2.04		$7.9 \cdot 10^{-2} \pm 1 \cdot 10^{-3}$	97±1
Au/AC_PVA-99	99		3.2	1.47		$1.8 \cdot 10^{-3} \pm 4 \cdot 10^{-4}$	16±0.2