Electronic Supplementary Information

How Insignificant Modifications of Photocatalysts Can Significantly Change their Photocatalytic Activity

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1. Materials and methods

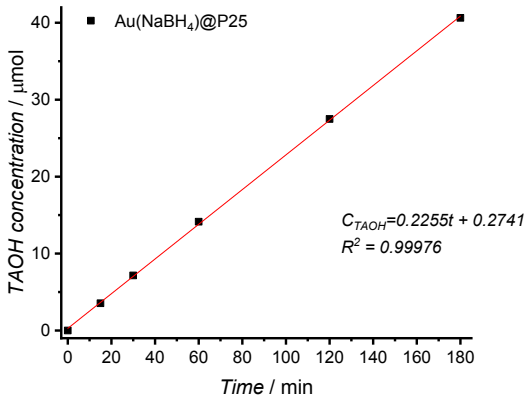


Figure S1. An exemplary plot of TAOH formation upon the visible light irradiation with a linear fit for $Au(NaBH_4)$@P25.

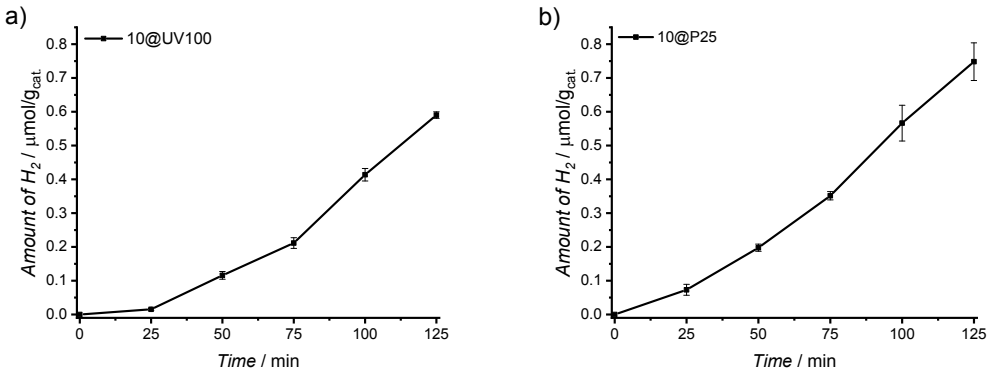


Figure S2. Exemplary plots of hydrogen formation upon the UV light irradiation for 10@UV100 (a) and 10@P25 (b).

2. Results and discussion

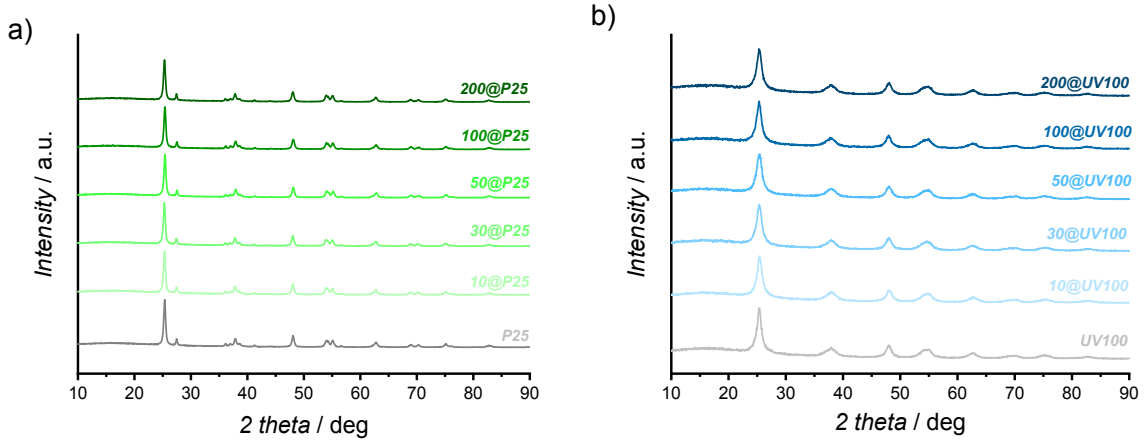


Figure S3. XRD patterns of the studied TiO_2 samples: a) P25 series, b) UV100 series.

Table S1. Specific surface area, pore size and pore volume of investigated materials. Errors within ±1%.

Material	Specific surface area (m^2/g)	Pore size (Å)	Pore volume (cm^3/g)
UV100	321.7	45.2	0.363
10@UV100	315.5	44.9	0.354
30@UV100	311.6	45.8	0.357
50@UV100	302.9	47.2	0.357
100@UV100	280.6	48.2	0.338
200@UV100	296.9	48.3	0.358
P25	52.7	132.5	0.175
10@P25	52.6	124.9	0.164
30@P25	51.7	125.4	0.162
50@P25	53.0	145.9	0.193
100@P25	52.4	135.4	0.177
200@P25	51.7	129.7	0.167

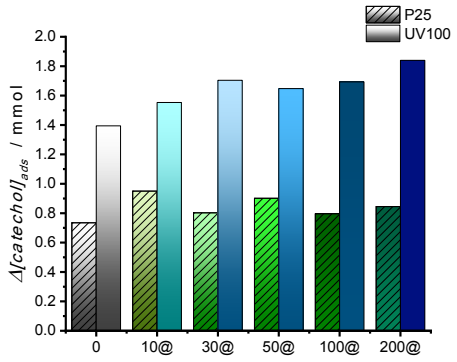


Figure S4. Amounts of catechol adsorbed at the surface of studied materials. The reproducibility of the measurements was within 1-2%.

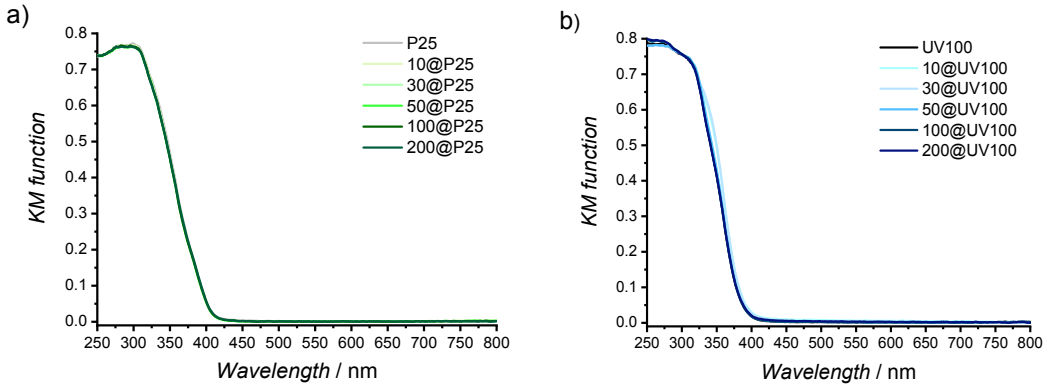
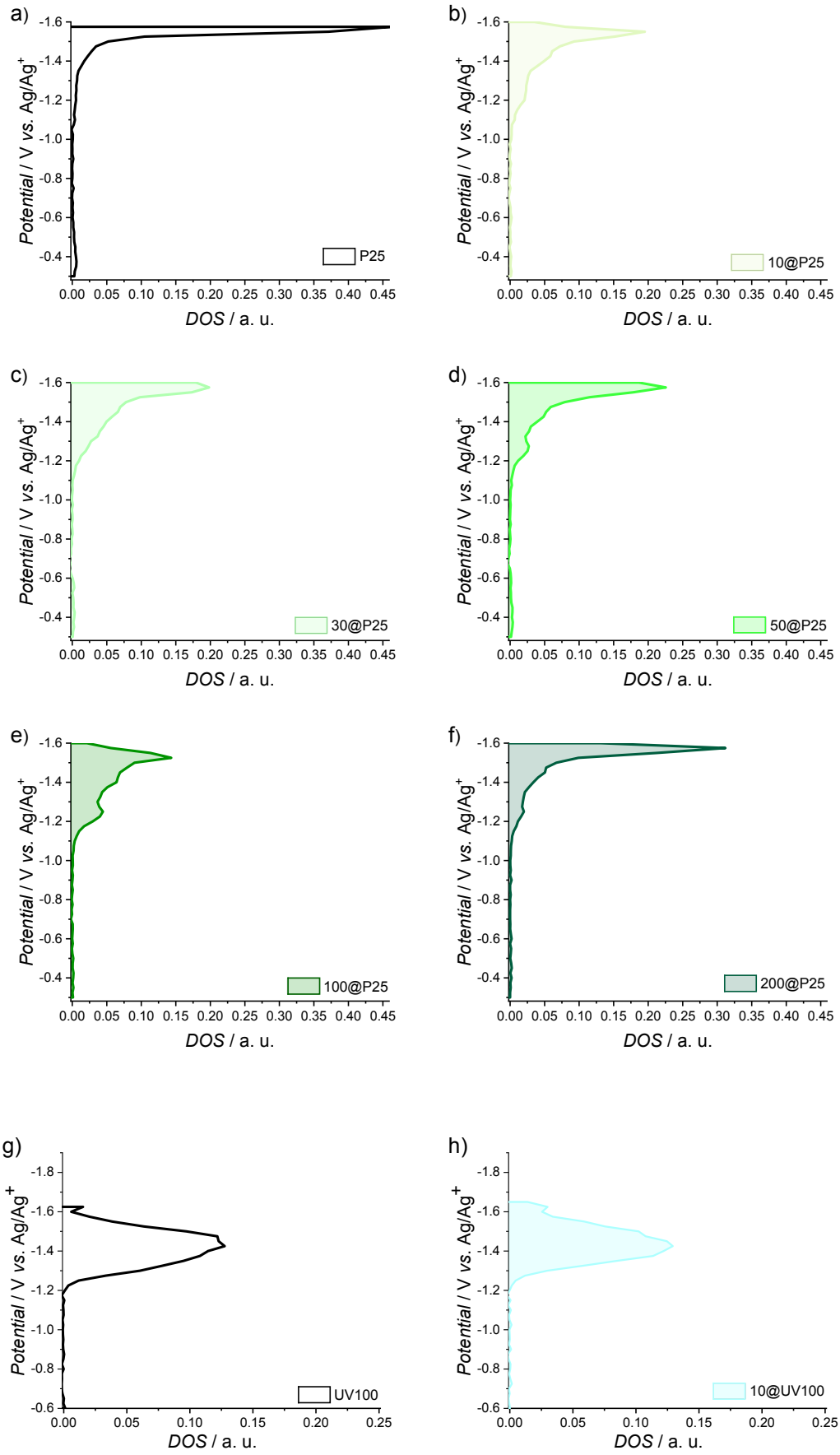


Figure S5. Diffuse reflectance spectra of surface modified TiO_2 (P25 – (a) and UV100 – (b)) materials.


a)
b)
c)
d)
e)
f)
g)
h)
Potential / V vs. Ag/Ag+
DOS / a. u.
P25
10@P25
30@P25
50@P25
100@P25
200@P25
UV100
10@UV100

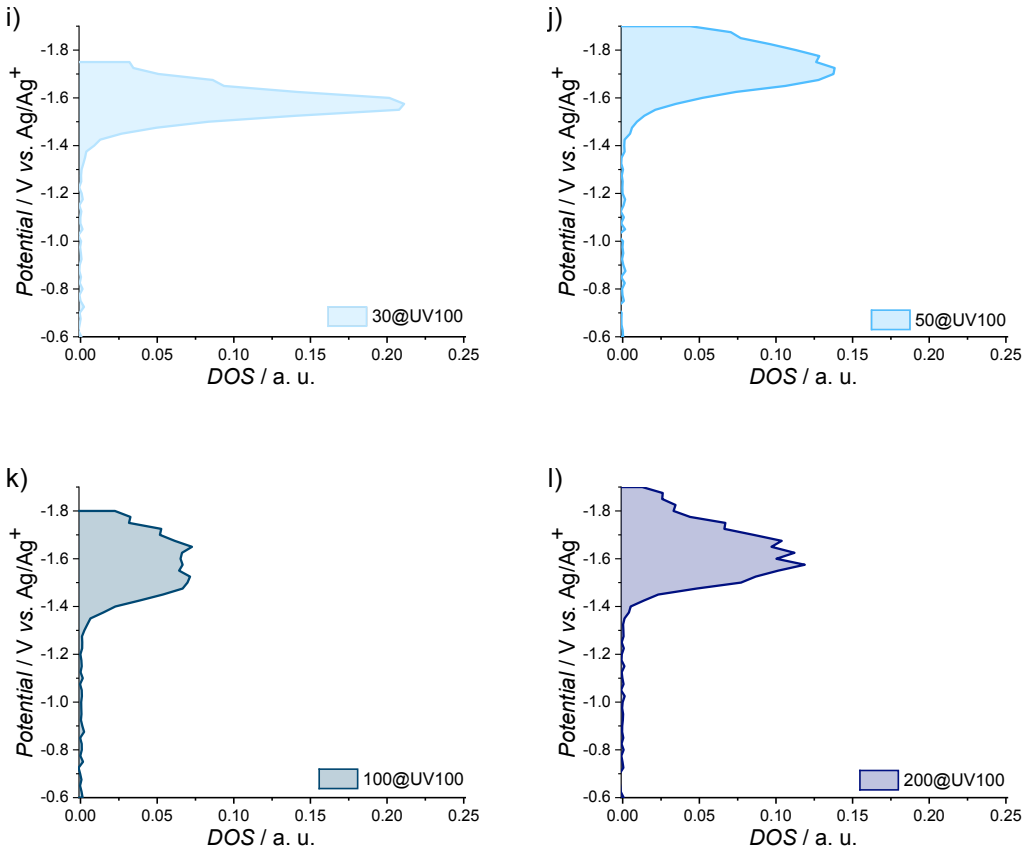


Figure S6. Representative density of states patterns for P25 (a), 10@P25 (b), 30@P25 (c), 50@P25 (d), 100@P25 (e), 200@P25 (f), UV100 (g), 10@UV100 (h), 30@UV100 (i), 50@UV100 (j), 100@UV100 (k) and 200@UV100 (l) after ALD application

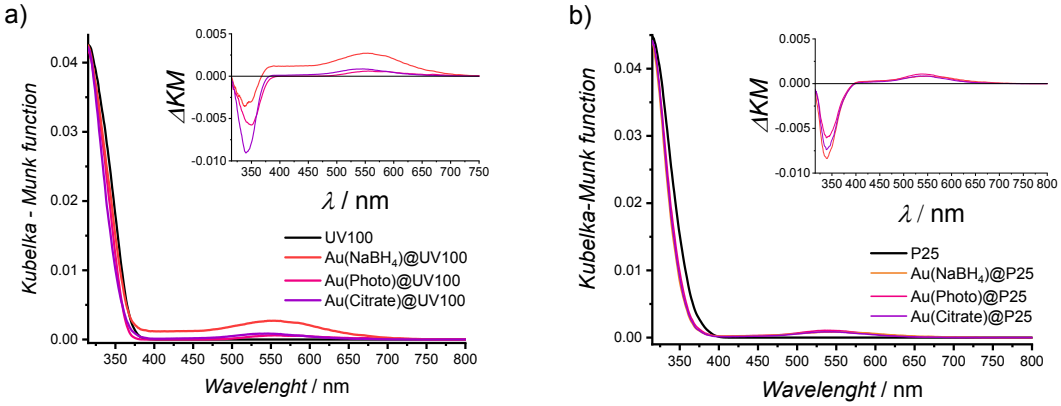


Figure S7. Diffuse reflectance spectra of TiO_2 (P25 – (a) and UV100 – (b)) materials with gold nanoparticles.

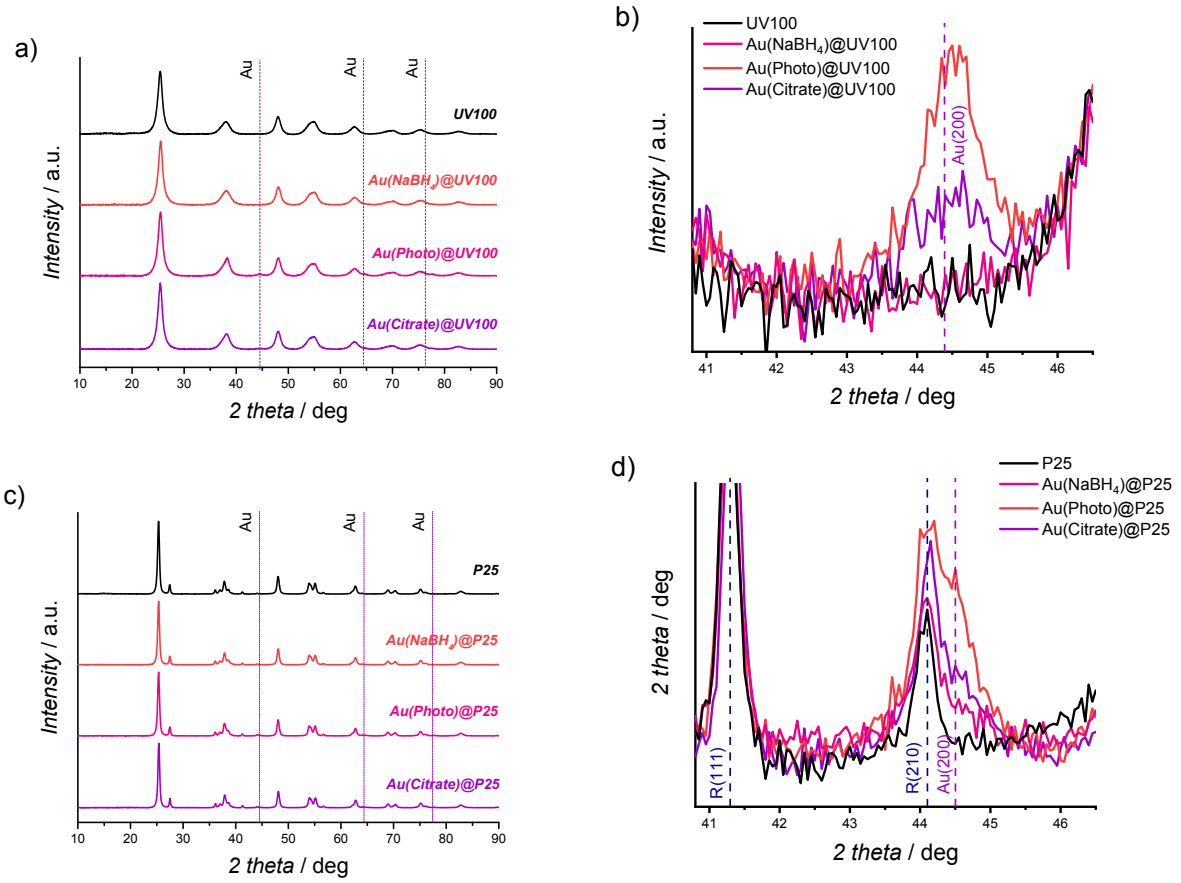
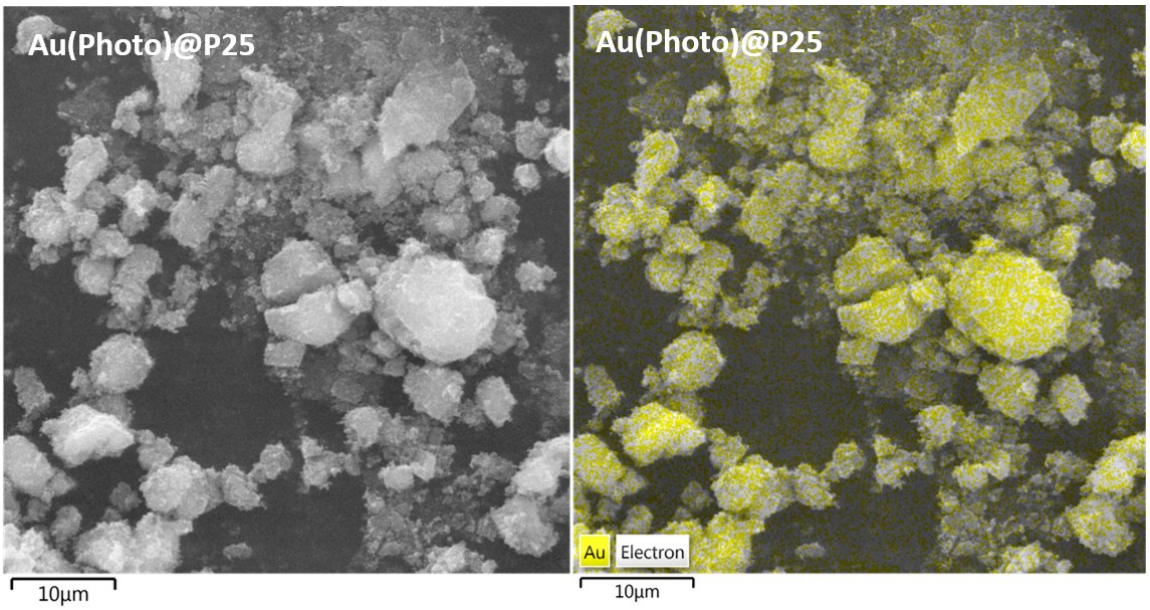
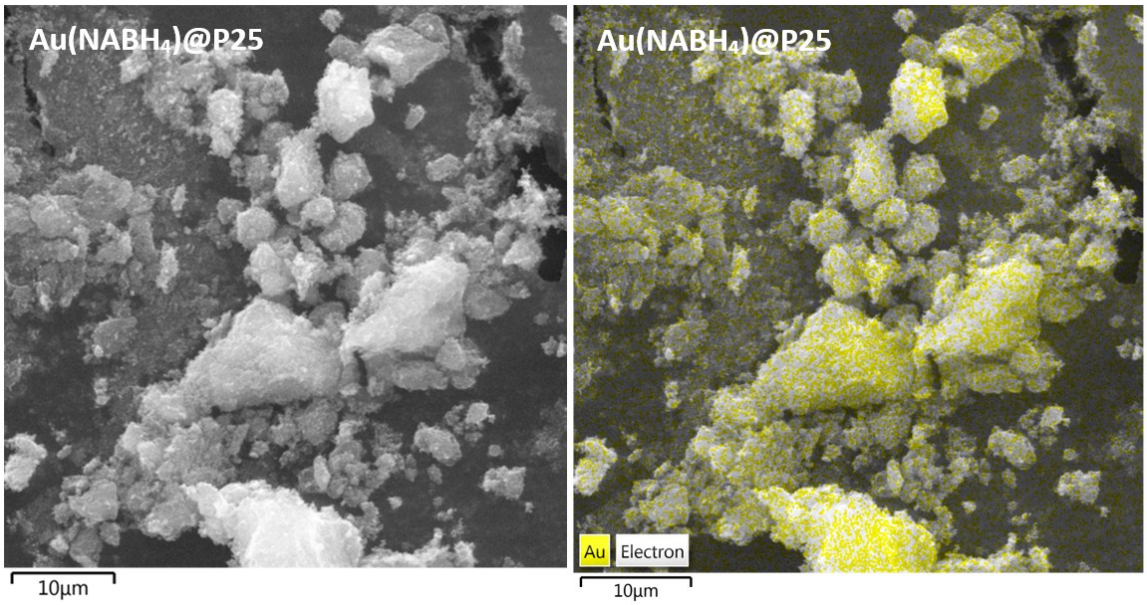
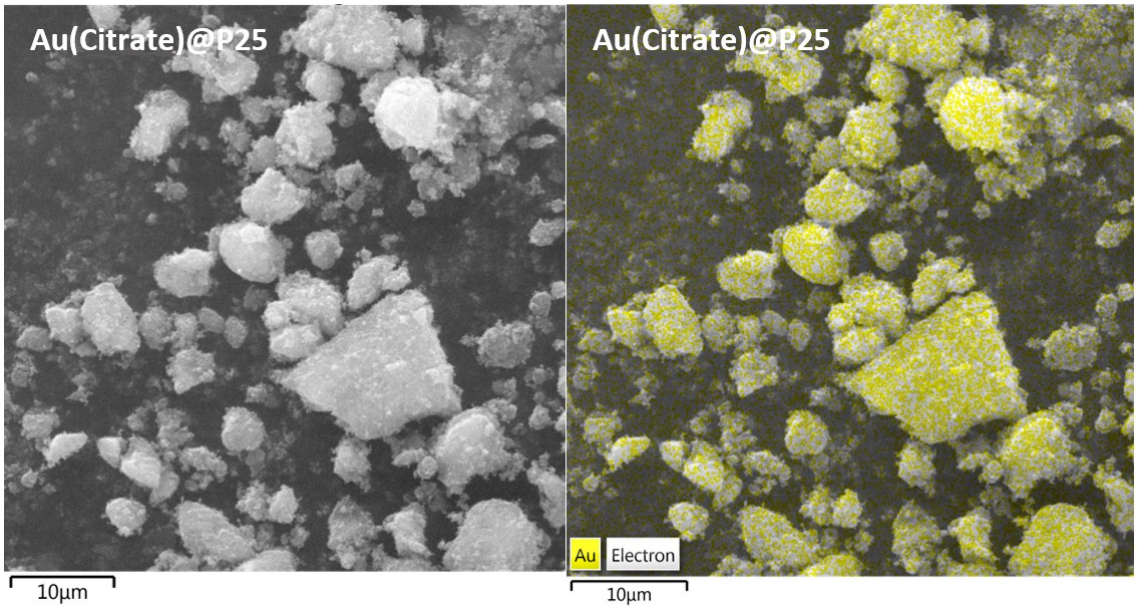
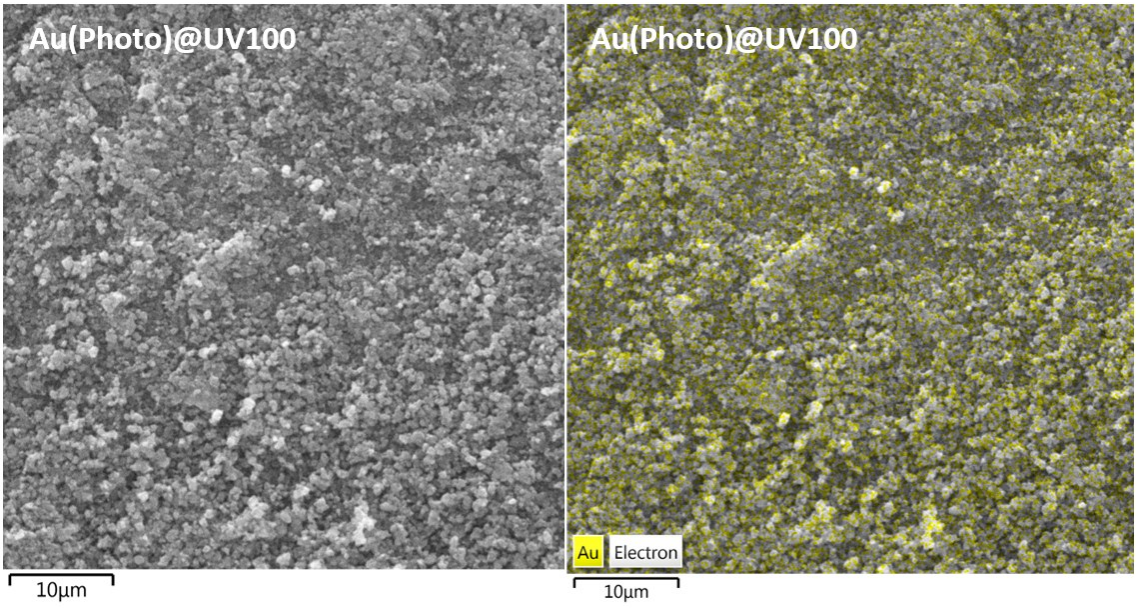


Figure S8. XRD patterns of investigated TiO_2 samples: a), b) UV100 and c), d) P25 synthetized in the presence of gold ions with marked reflexes (Au – gold).




Au(NABH4)@P25
10µm
Au(NABH4)@P25
Au
Electron
10µm


Au(Citrate)@P25
10µm
Au(Citrate)@P25
Au
Electron
10µm


Au(Photo)@UV100
10µm
Au(Photo)@UV100
Au
Electron
10µm

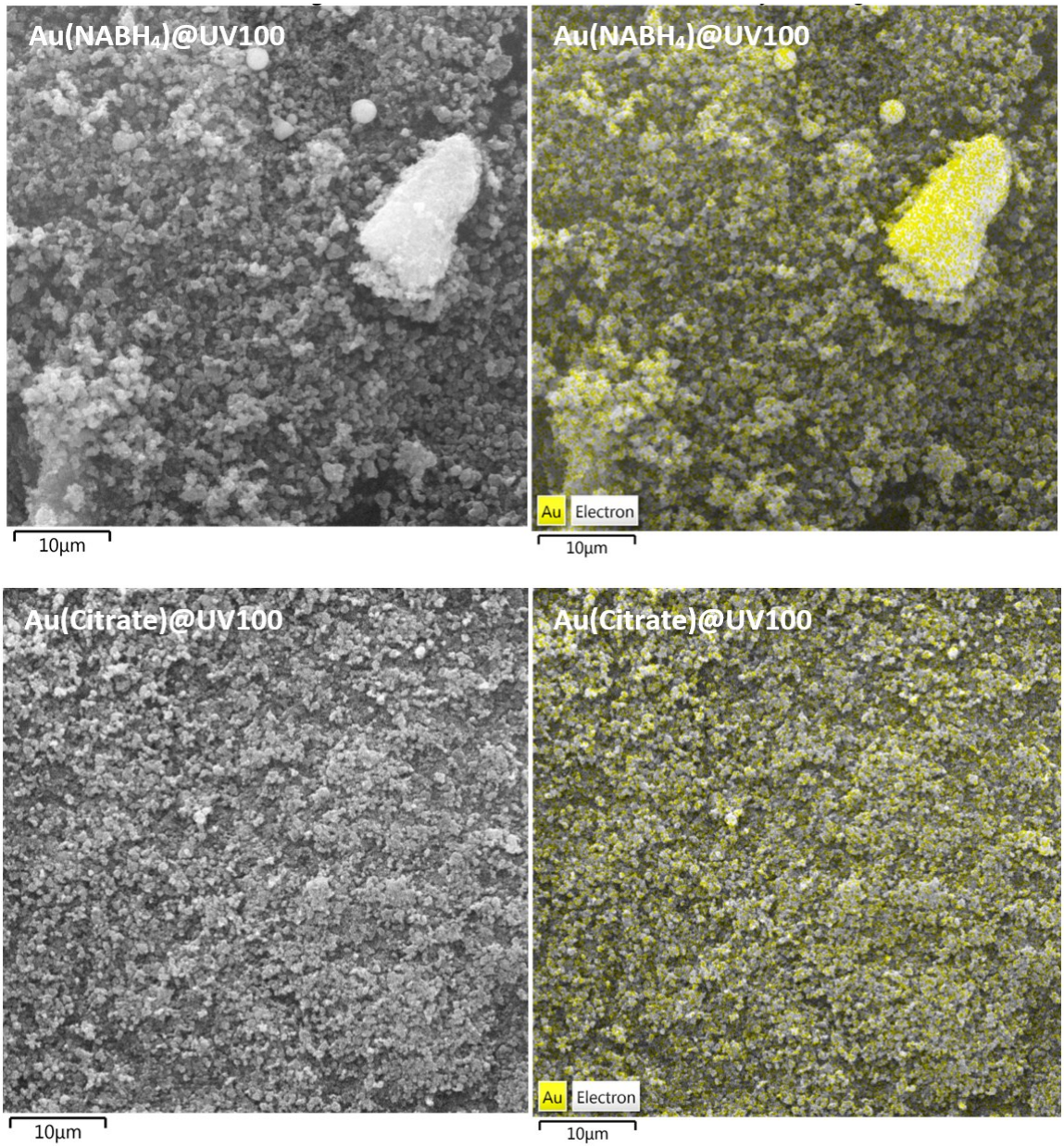


Figure S9. EDS analysis of materials based on P25 and UV100 synthesized in the presence of gold.

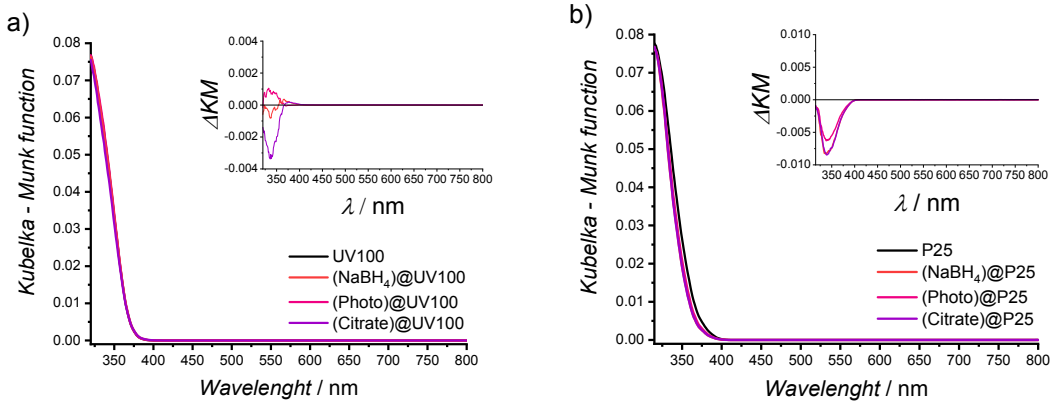


Figure S10. Diffuse reflectance spectra of TiO_2 (UV100 – (a) and P25 – (b)) materials without gold.

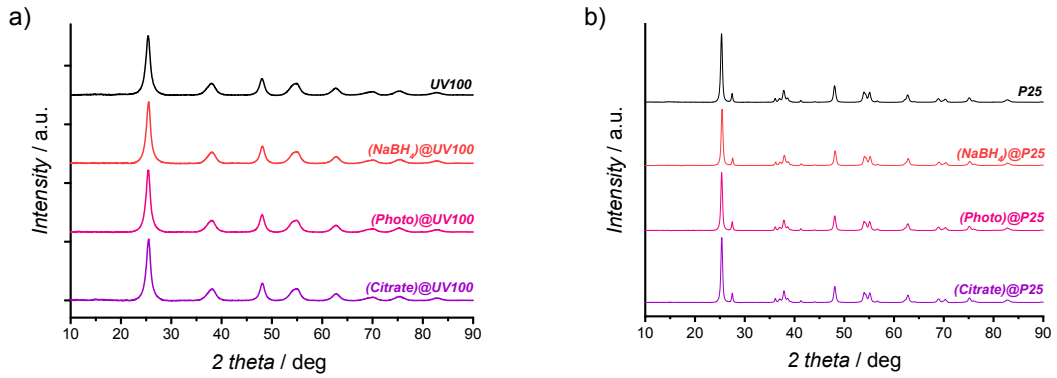
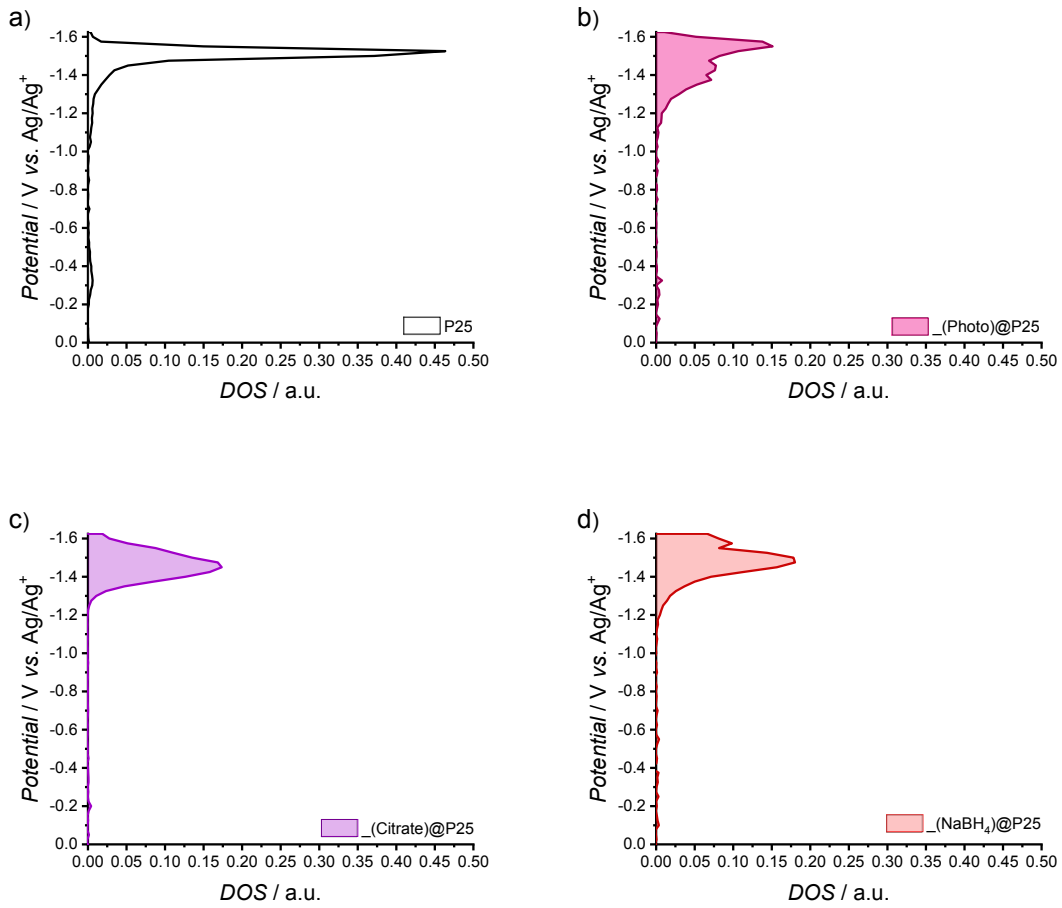


Figure S11. XRD patterns of investigated TiO_2 samples: a) UV100 and b) P25 synthetized in the absence of gold ions.



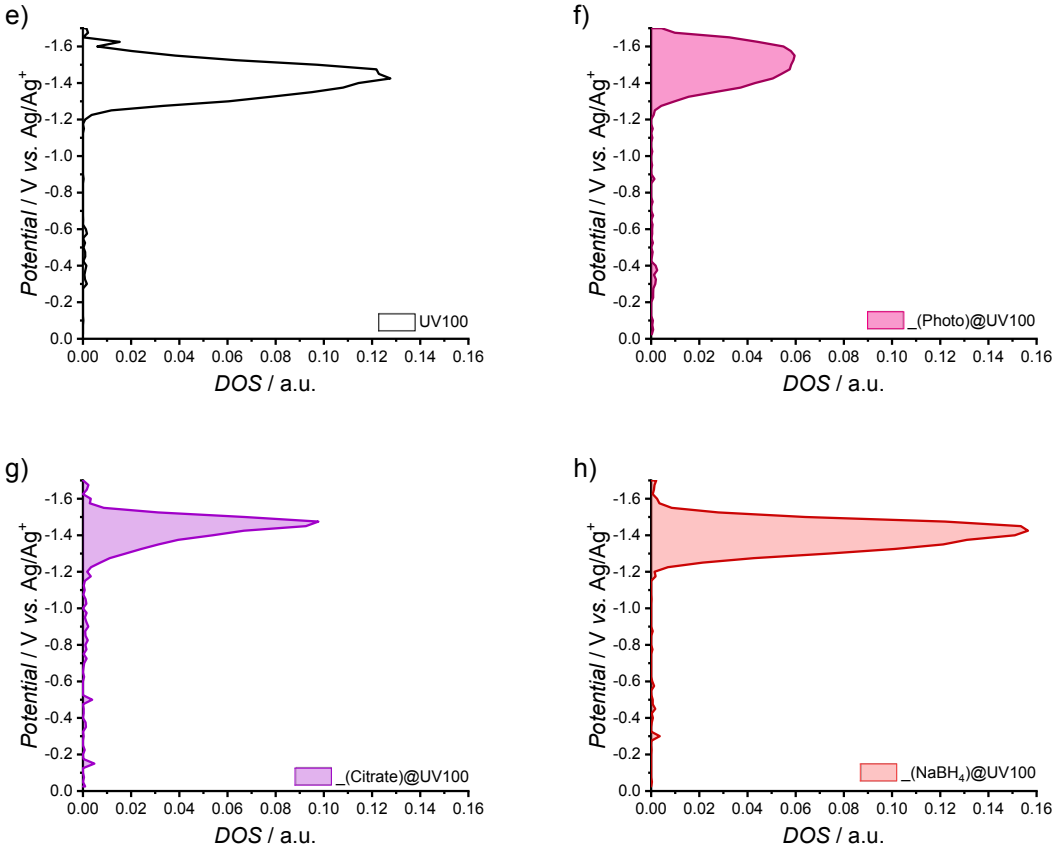


Figure S12. Representative density of states patterns for P25 (a), _(Photo)@P25 (b), _(Citrate)@P25 (c), _($NaBH_4$)@P25 (d), UV100 (e), _(Photo)@UV100 (f), _(Citrate)@UV100 (g) and _($NaBH_4$)@UV100 (h) for materials prepared without gold precursor.

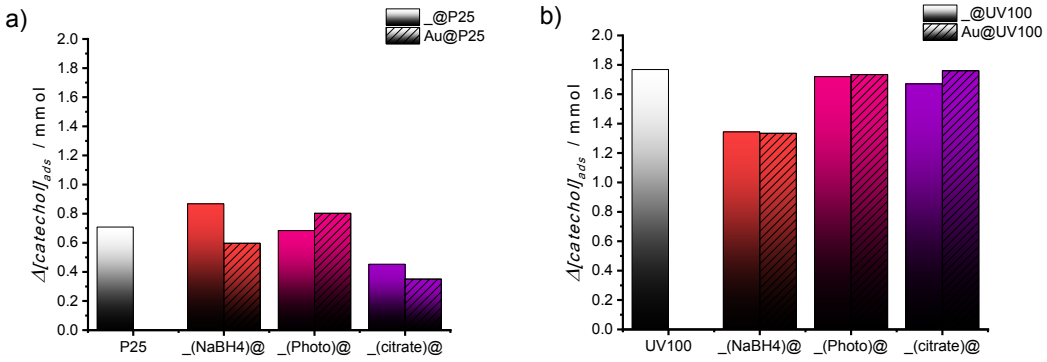


Figure S13. Amounts of catechol adsorbed at the surface of materials based on P25 (a) and UV100 (b). The reproducibility of the measurements was within 1-2%.