SUPPORTING INFORMATIONS

Enhancing the activity of gold supported catalysts by oxide coating: towards efficient oxidations.

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1. XPS analysis

The X-ray photoelectron spectroscopies (XPS) of core-shell nanoparticles were obtained on Kratos Axis-Ultra spectrophotometer irradiated with a monochromatic Al Kα (1486.6 eV) radiation (10 kV; 22 mA). The analysis chamber was operated under ultrahigh vacuum conditions with an approximate pressure of 5×10^{-7} Pa. The sample was. The binding energies were calibrated using C1s at 284.6 eV.

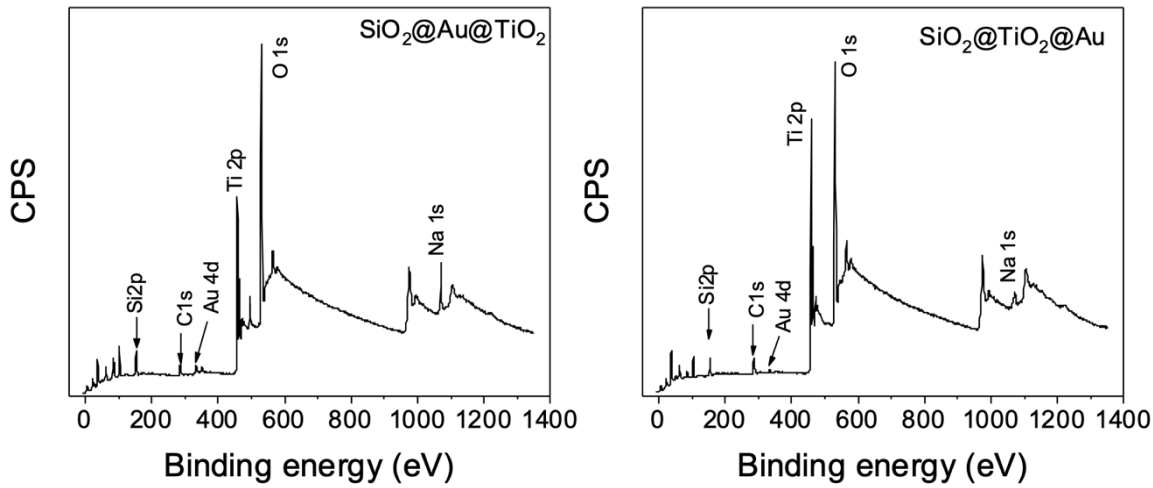

Figure S1: XPS general spectra for SiO_2@Au@TiO_2 and SiO_2@TiO_2@Au catalysts

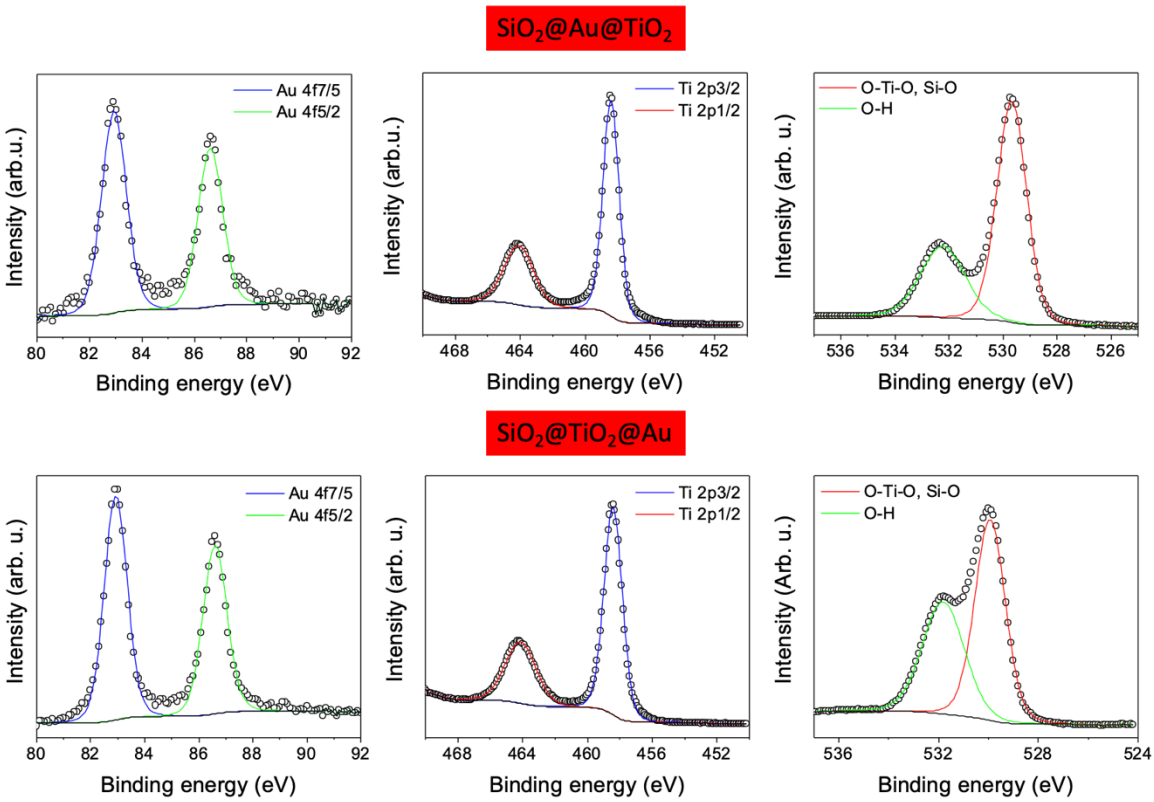

Figure S2: XPS Au 4f, Si 2p and O 1s spectra for SiO_2@Au@TiO_2 and SiO_2@TiO_2@Au catalysts.

2. TEM analysis

Transmission electron microscopy (TEM) observations and EDS X-ray microanalysis were carried out on a JEOL JEM 2100 Plus transmission electron microscope, operating at 200 kV, interfaced to Oxford Instruments AZtec EDS system with an X-Max T large area (80 mm2) SDD detector. The images were collected with a 4008 × 2672 pixels CCD camera (Gatan Orius SC1000). TEM images were processed by Image J software.

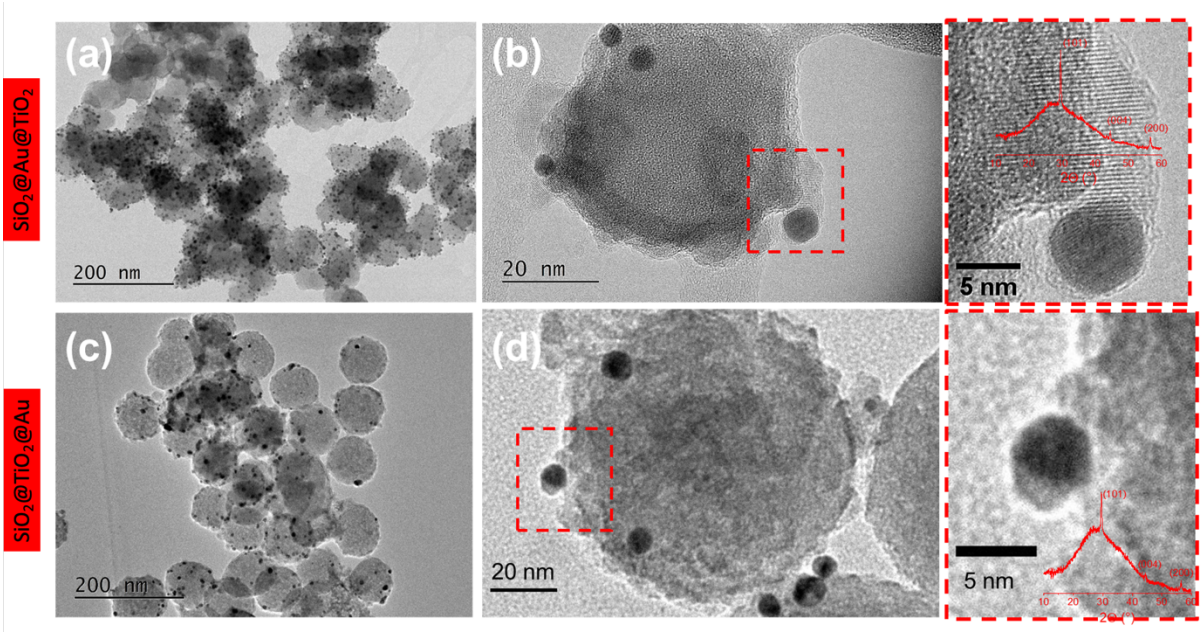

Figure S3: HRTEM images for SiO_2@Au@TiO_2 and SiO_2@TiO_2@Au catalysts

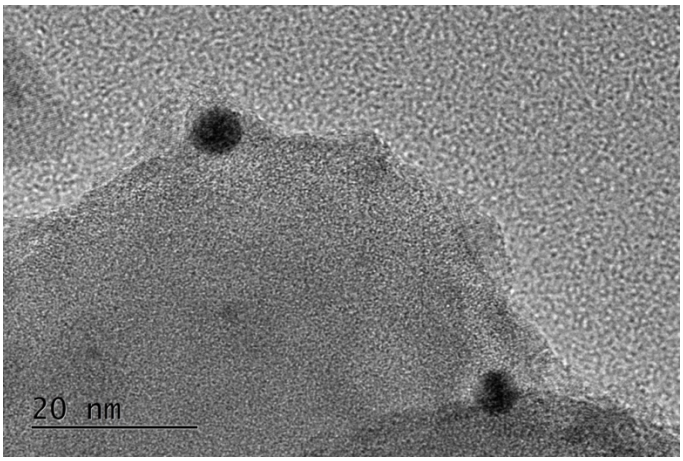

Figure S4: HRTEM image for SiO_2@Au@TiO_2 (0.25% wt. Au)

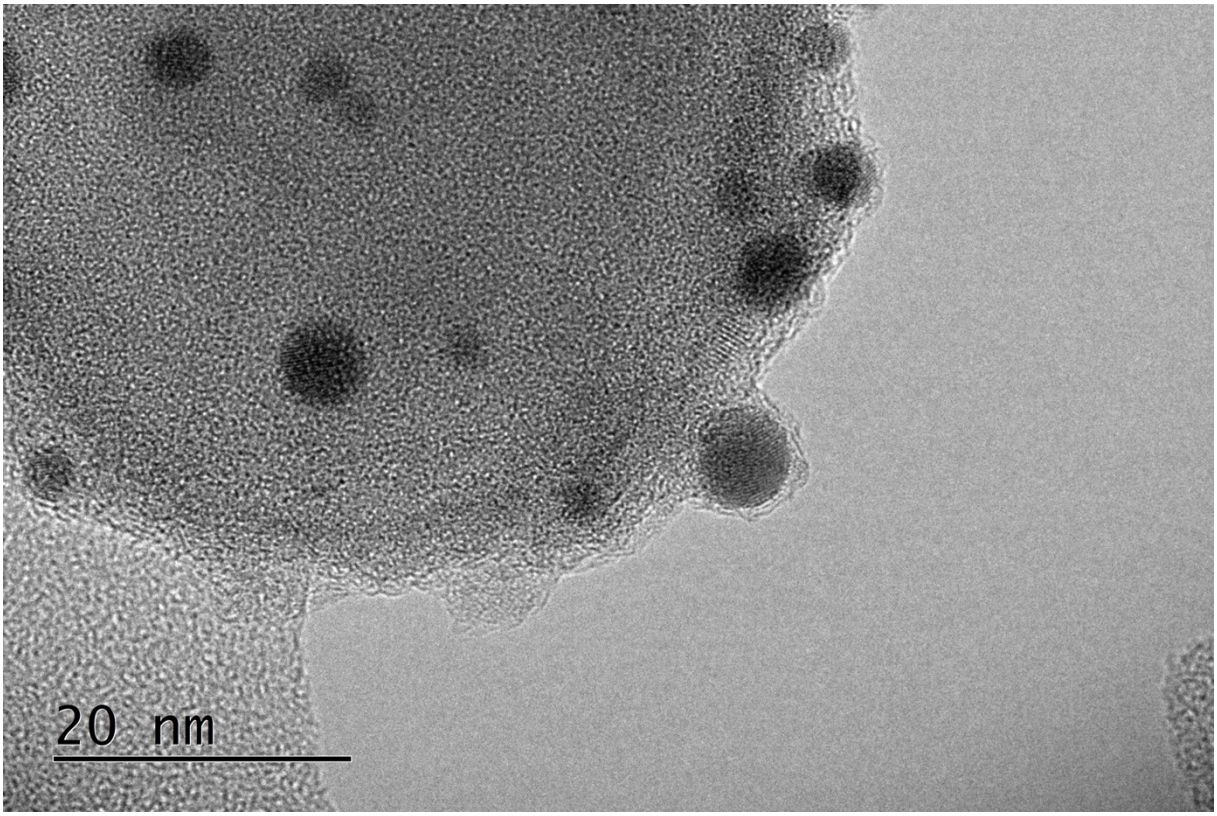

Figure S5: HRTEM image for SiO_2@Au@TiO_2 (0.50% wt. Au)

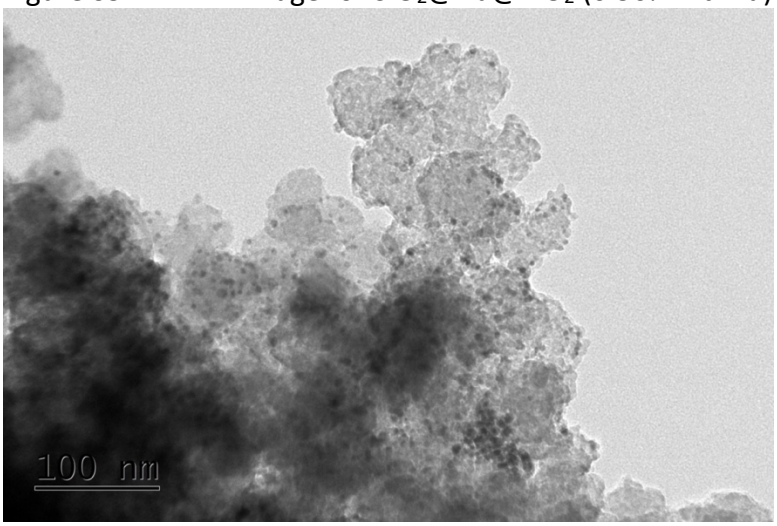

Figure S6: TEM image for SiO_2@Au@TiO_2 (1,0% wt. Au)

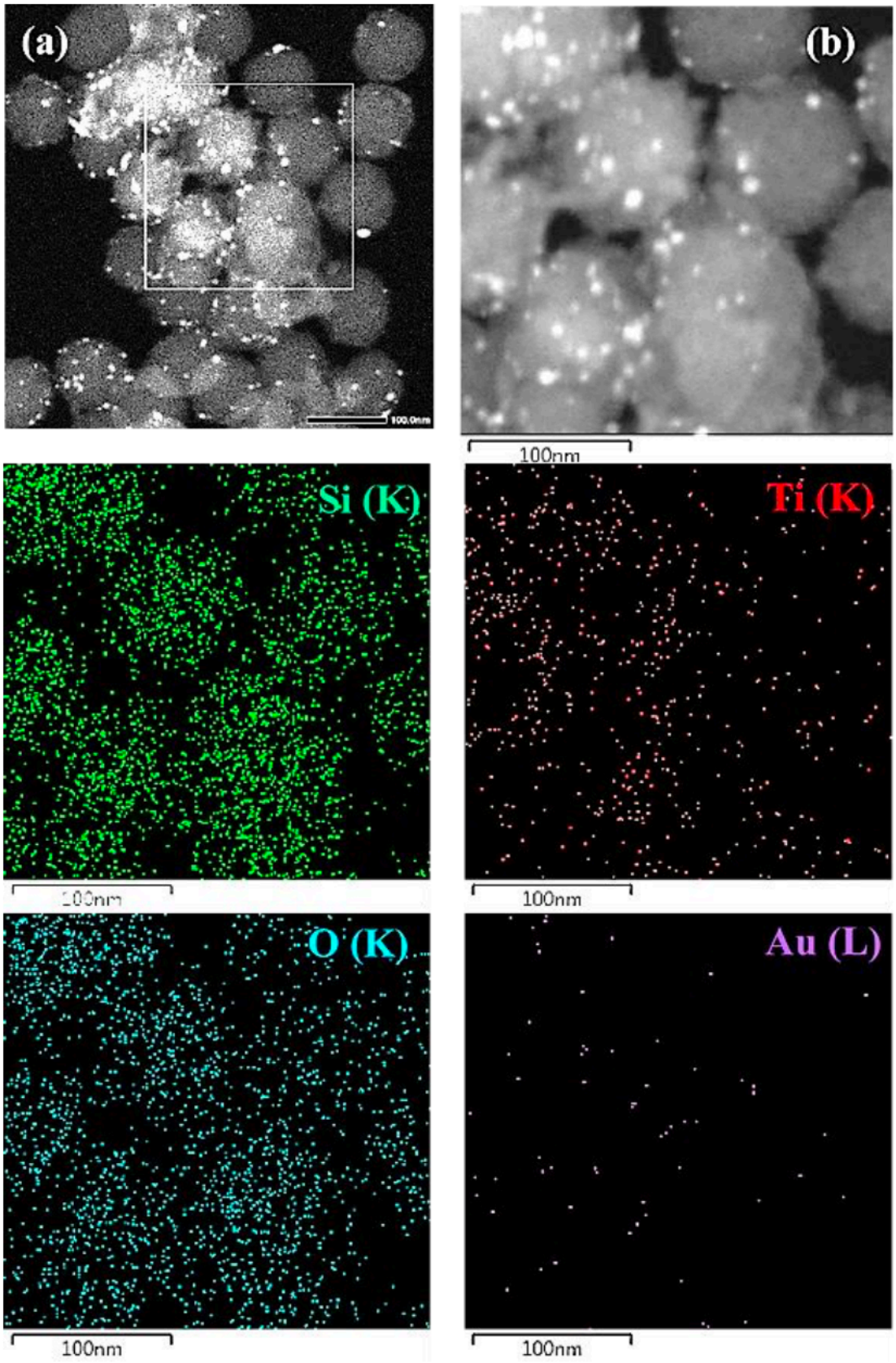

Figure S7: (a,b) HAADAF-STEM images and EDS elemental mapping on Si (K), Ti (K), O (K) and Au (L) for SiO2@Au@TiO2 nanostructure with 0.5% wt. % ratio. Reprinted with permission from [1].

3. XRD analysis

The X-ray diffraction (XRD) patterns of the solids were obtained using a Bruker D8-ADVANCE powder X-ray diffractometer equipped with a CuK**α** radiation source (L = 0.1538 nm) operating with an accelerating voltage of 40 kV and an emission current of 40 mA. The intensity data were collected over a 2θ range of 10 to 70°, with a step size of 0.014° using a time counter of 0.1 s per step.

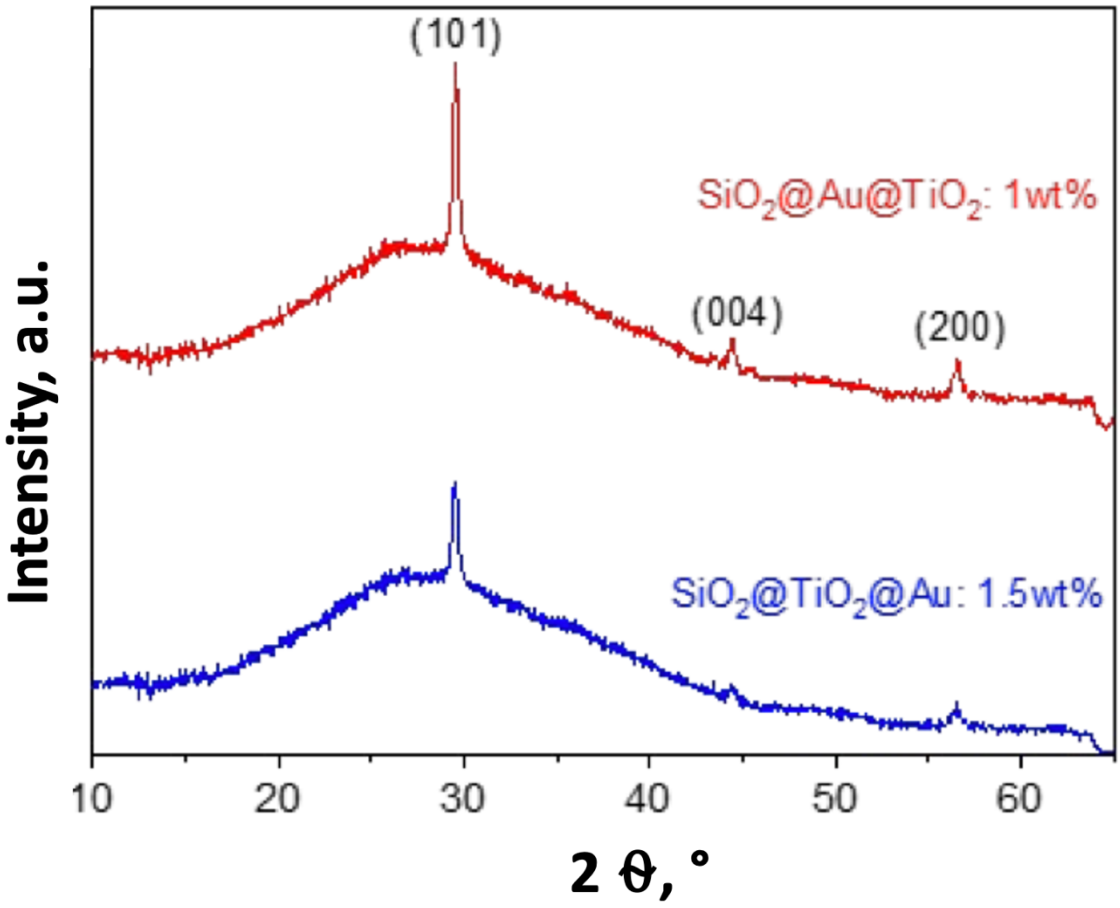

Figure S8: XRD patterns for SiO_2@Au@TiO_2 (1.0 % wt. Au) and SiO_2@TiO_2@Au (1.5 % wt. Au) catalysts

Table S1 :

	Au wt. %	Initial pH	Final pH	Furfural conversion [%]	Furoic acid selectivity [%]	Carbon balance [%]
Au/MgO	1.6	10.3	8.9	100	100	100
Au/TiO_2	1.6	3.7	3.8	50	60	92
Au/SiO_2	1.6	3.7	3.7	18	5	81

$Au/SiO_2@TiO_2$	1.8	3.7	3.8	35	11	69
$SiO_2@Au@TiO_2$	0.25	3.7	2.5	100	100	100

References :

[1] *A soft-chemistry assisted strong metal–support interaction on a designed plasmonic core–shell photocatalyst for enhanced photocatalytic hydrogen production.* Gesesse Getaneh Diress, Wang Cong, Chang Bor Kae, Tai Shih-Hsuan, Beaunier Patricia, Wojcieszak Robert, Remita Hynd, Colbeau-Justin Christophe, Ghazzal Mohamed Nawfal. Nanoscale, vol. 12, pg. 7011-7023 (**2020**)