Highly Efficient Nanostructured Metal-decorated Hybrid Semiconductors for Solar Conversion of CO₂ to Absolute CO Selectivity

Chau T. K. Nguyen,^{1,2} Ngoc Quang Tran,^{1,3} Sohyeon Seo,¹ Simgeon Oh,^{1,3} Jianmin Yu,^{1,2} Meeree Kim,^{1,2} Thi Anh Le,^{1,2} Jinsun Lee,^{1,2} Hyoyoung Lee^{1,2,3,}*

¹Center for Integrated Nanostructure Physics, Institute for Basic Science (IBS), Sungkyunkwan University, Suwon, 440-746, Republic of Korea.

²Department of Chemistry, Sungkyunkwan University, Suwon 440-746, Korea.

³Department of Energy Science, Sungkyunkwan University, Suwon 440-746, Korea.

STEM, HRTEM images of 7BT/W1-A1 and STEM-HAADF of 7BT/W1-A1 HNPs

XPS spectra of 7BT/W1-A1 HNPs.

XPS spectra of 7BT/W1 HNPs.

Element	Wt%	Wt% Sigma	Atomic %
O	59.55	0.28	82.96
Ti	35.28	0.24	16.42
W	5.17	0.20	0.63
Total:	100.00		100.00

EDX spectrums of 7BT/W1 HNPs.

Element	Wt%	Wt% Sigma	Atomic %
O	52.64	0.87	81.08
Ti	30.75	0.56	15.82
W	15.58	0.39	0.98
Ag	1.03	1.24	2.13
Total:	100.00		100.00

EDX spectrums of 7BT/W1 HNPs.

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Sample: sample 1

Operator:

Submitter:

File: D:\...\20190418\190418-1.SMP

Started:	2019-04-18 2:22:10	Analysis Adsorptive:	N2
Completed:		Analysis Bath Temp.:	77.300 K
Report Time:	2019-04-18 8:43:53	Sample Mass:	0.0750 g
Warm Free Space:	20.5820 cm ³ Measured	Cold Free Space:	60.4155 cm ³ Measured
Equilibration Interval:	10 s	Low Pressure Dose:	None
Sample Density:	1.000 g/cm ³	Automatic Degas:	No

Summary Report

Surface Area

Single point surface area at P/Po = 0.291153955: 49.6263 m²/gBET Surface Area: 50.6095 m²/gBJH Adsorption cumulative surface area of pores
between 1.7000 nm and 300.0000 nm diameter: 52.800 m²/gBJH Desorption cumulative surface area of pores
between 1.7000 nm and 300.0000 nm diameter: 53.3446 m²/g

Pore Volume

Single point adsorption total pore volume of pores
less than 212.0209 nm diameter at P/Po = 0.990801963: 0.352006 cm³/gBJH Adsorption cumulative volume of pores
between 1.7000 nm and 300.0000 nm diameter: 0.351341 cm³/gBJH Desorption cumulative volume of pores
between 1.7000 nm and 300.0000 nm diameter: 0.351710 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 27.82134 nm

BJH Adsorption average pore diameter (4V/A): 26.6167 nm

BJH Desorption average pore diameter (4V/A): 26.3727 nm

BET surface areas using nitrogen adsorption/desorption isotherm measurements at room temperature and pore-size distribution of 7BT/W1-A1 HNPs.

Sample: sample 2
 Operator:
 Submitter:
 File: D:\...\20190418\190418-2.SMP

Started: 2019-04-18 2:22:10
 Completed: 2019-04-18 8:44:00
 Report Time: 2019-04-18 8:44:00
 Warm Free Space: 20.4534 cm³ Measured
 Equilibration Interval: 10 s
 Sample Density: 1.000 g/cm³

Analysis Adsorptive: N2
 Analysis Bath Temp.: 77.300 K
 Sample Mass: 0.0640 g
 Cold Free Space: 59.9557 cm³ Measured
 Low Pressure Dose: None
 Automatic Degas: No

Summary Report

Surface Area

Single point surface area at P/Po = 0.291143499: 26.5478 m²/g
 BET Surface Area: 26.8199 m²/g
 BJH Adsorption cumulative surface area of pores
 between 1.7000 nm and 300.0000 nm diameter: 25.280 m²/g
 BJH Desorption cumulative surface area of pores
 between 1.7000 nm and 300.0000 nm diameter: 28.8325 m²/g

Pore volume

Single point adsorption total pore volume of pores
 less than 183.3444 nm diameter at P/Po = 0.989341176: 0.181533 cm³/g
 BJH Adsorption cumulative volume of pores
 between 1.7000 nm and 300.0000 nm diameter: 0.179985 cm³/g
 BJH Desorption cumulative volume of pores
 between 1.7000 nm and 300.0000 nm diameter: 0.180808 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 27.07442 nm
 BJH Adsorption average pore diameter (4V/A): 28.4783 nm
 BJH Desorption average pore diameter (4V/A): 25.0840 nm

BET surface areas using nitrogen adsorption/desorption isotherm measurements at room temperature and pore-size distribution of 7BT NPs.

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Sample:	sample 3		
Operator:			
Submitter:			
File:	D:\...\20190418\190418-3.SMP		
Started:	2019-04-18 2:22:10	Analysis Adsorptive:	N2
Completed:		Analysis Bath Temp.:	77.300 K
Report Time:	2019-04-18 8:44:06	Sample Mass:	0.0530 g
Warm Free Space:	19.9778 cm ³ Measured	Cold Free Space:	58.0917 cm ³ Measured
Equilibration Interval:	10 s	Low Pressure Dose:	None
Sample Density:	1.000 g/cm ³	Automatic Degas:	No

Summary Report

Surface Area

Single point surface area at P/Po = 0.291058388:	41.0879 m ² /g
BET Surface Area:	41.5520 m ² /g
BJH Adsorption cumulative surface area of pores between 1.7000 nm and 300.0000 nm diameter:	41.838 m ² /g
BJH Desorption cumulative surface area of pores between 1.7000 nm and 300.0000 nm diameter:	41.4614 m ² /g

Pore Volume

Single point adsorption total pore volume of pores less than 272.3805 nm diameter at P/Po = 0.992863233:	0.319769 cm ³ /g
BJH Adsorption cumulative volume of pores between 1.7000 nm and 300.0000 nm diameter:	0.320182 cm ³ /g
BJH Desorption cumulative volume of pores between 1.7000 nm and 300.0000 nm diameter:	0.319742 cm ³ /g

Pore Size

Adsorption average pore width (4V/A by BET):	30.78257 nm
BJH Adsorption average pore diameter (4V/A):	30.6113 nm
BJH Desorption average pore diameter (4V/A):	30.8472 nm

BET surface areas using nitrogen adsorption/desorption isotherm measurements at room temperature and pore-size distribution of 7BT/W1 HNPs.

Experimental Condition

- Microwave frequency : 9.65 GHz
- Modulation frequency : 100 kHz
- Microwave power : 1 mW
- Mod. Amp. : 10 G
- Temperature : R.T.