

## 负载 Pt-WO<sub>x</sub> 催化剂上甘油选择氢解合成 1,3-丙二醇

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## Selective Hydrogenolysis of Glycerol to 1,3-Propanediol on Supported Pt-WO<sub>x</sub> Catalysts

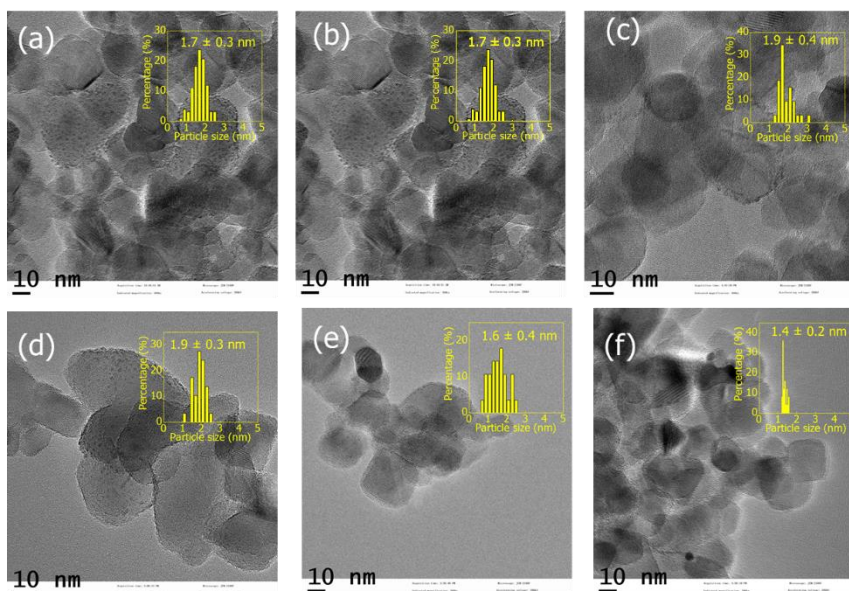
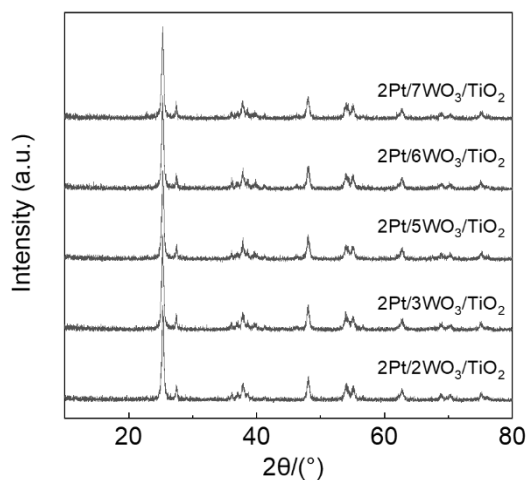
Yuming Li, Haichao Liu \*

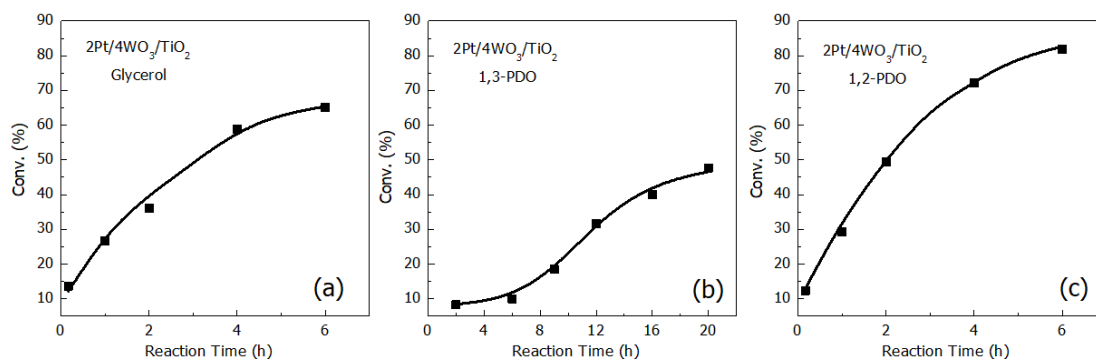
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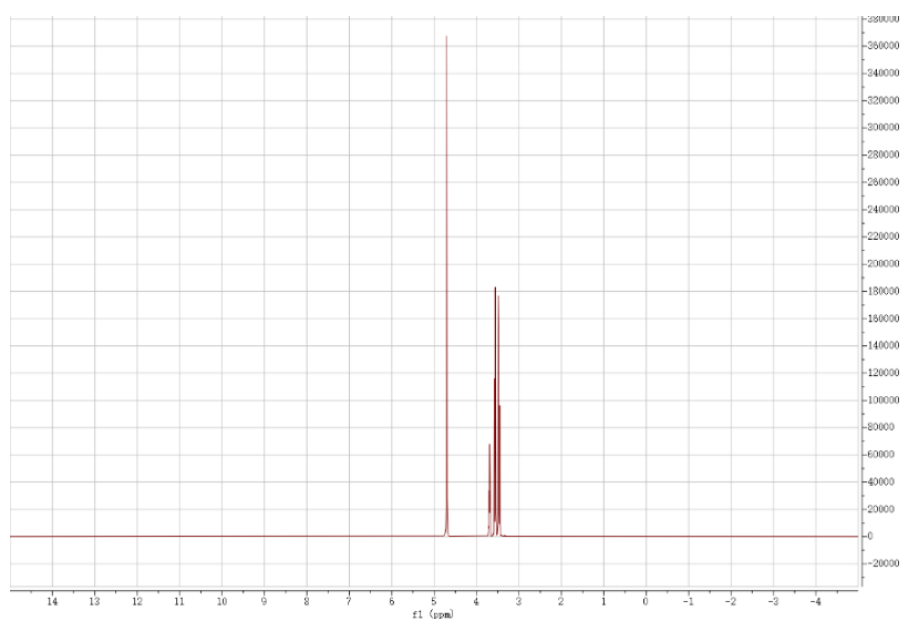
**Table S1 The purity and supply company of the chemicals and gases used in this work.**

Chemicals	Purity	Company
H <sub>2</sub> PtCl <sub>6</sub> ·6H <sub>2</sub> O	Pt > 37%	Sinopharm Chemical Reagent Co., Ltd
(NH <sub>4</sub> ) <sub>6</sub> W <sub>7</sub> O <sub>24</sub> ·6H <sub>2</sub> O	AR	Sinopharm Chemical Reagent Co., Ltd
TiO <sub>2</sub>	> 99%	Degussa AG
ZrO <sub>2</sub>	> 99%	Alfa Aeser
Al <sub>2</sub> O <sub>3</sub>	AR	Sinopharm Chemical Reagent Co., Ltd
Glycerol	> 99%	Alfa Aeser
1,2-propanediol	99%	Alfa Aeser
1,3-propanediol	98%	Alfa Aeser
H <sub>2</sub>	> 99.9%	Beijing Huayuan Gases Company
N <sub>2</sub>	> 99.9%	Beijing Huayuan Gases Company
CO	> 99.9%	Beijing Huayuan Gases Company
D <sub>2</sub>	> 99%	Beijing Nanya Gases Company

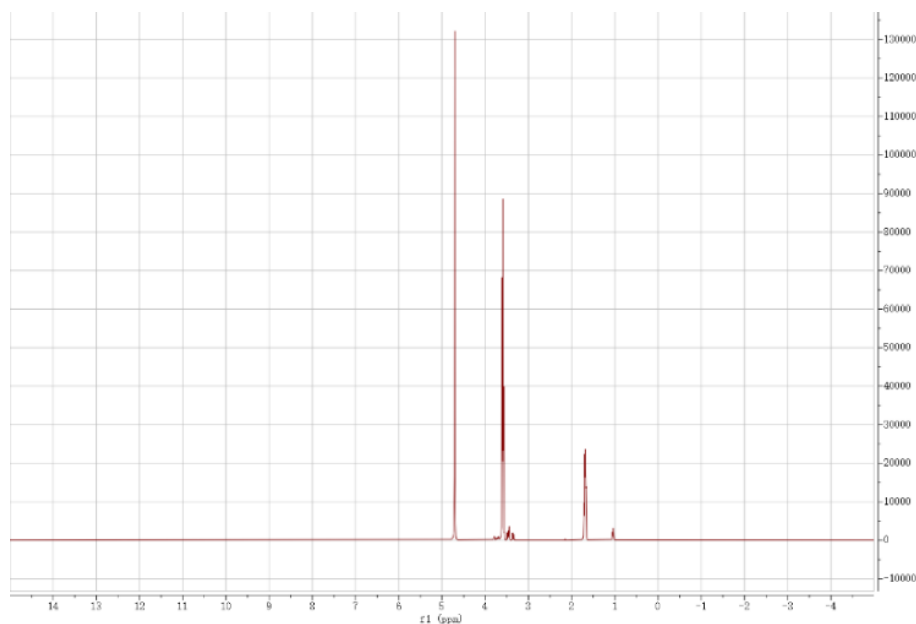
**Fig. S1 TEM images and histograms of Pt particle size distribution of (a) 2Pt/1WO<sub>3</sub>/TiO<sub>2</sub>, (b) 2Pt/2WO<sub>3</sub>/TiO<sub>2</sub>, (c) 2Pt/3WO<sub>3</sub>/TiO<sub>2</sub>, (d) 2Pt/5WO<sub>3</sub>/TiO<sub>2</sub>, (e) 2Pt/6WO<sub>3</sub>/TiO<sub>2</sub>, (f) 2Pt/7WO<sub>3</sub>/TiO<sub>2</sub>.****Fig. S2 XRD patterns of 2Pt/*x*WO<sub>3</sub>/TiO<sub>2</sub> catalysts.**



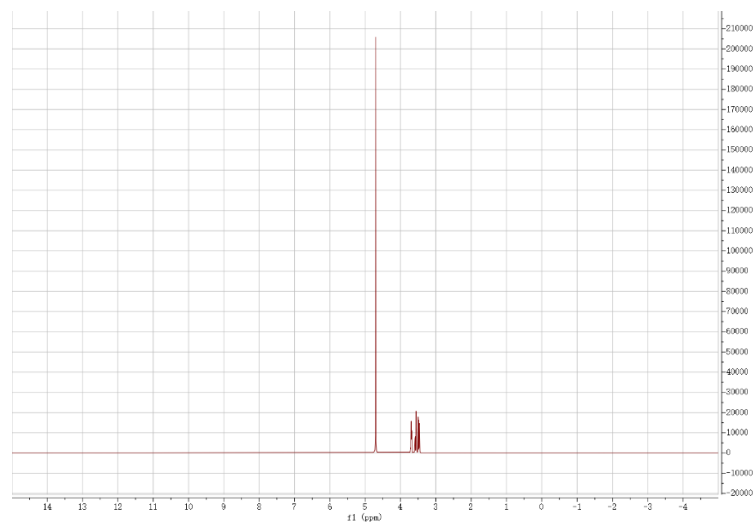
**Fig. S3** Kinetic rate constant for hydrogenolysis of glycerol and 1,2- and 1,3 propanediols over 2Pt/4WO<sub>3</sub>/TiO<sub>2</sub> (Reaction conditions: 0.5 g 2%Pt catalyst, 10 ml 10% aqueous solution, 140 °C, 4 MPa H<sub>2</sub>).



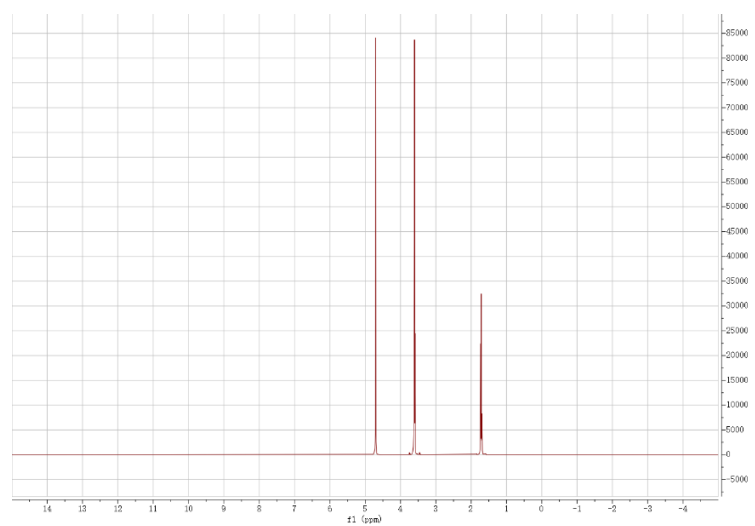
**Fig. S4** <sup>1</sup>H-NMR spectrum of glycerol.



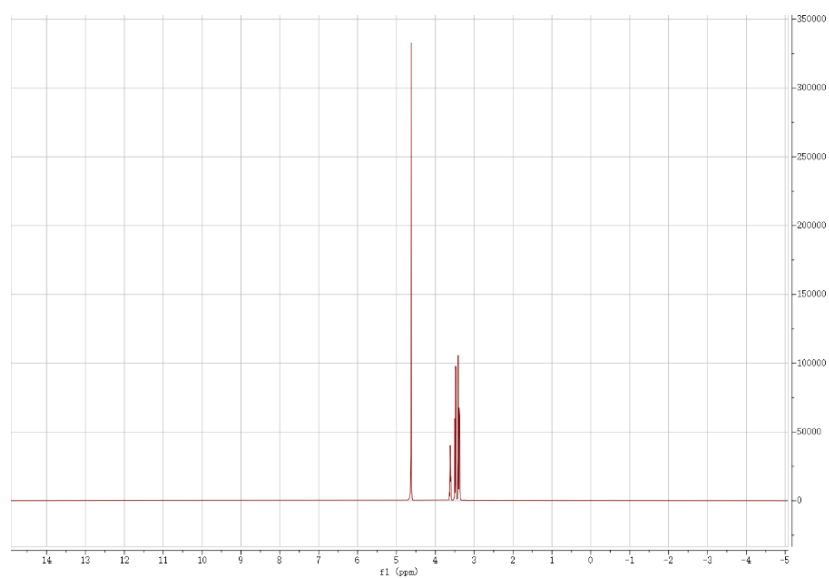
**Fig. S5** <sup>1</sup>H-NMR spectrum of glycerol after 2 h deuteration reaction at 140 °C.



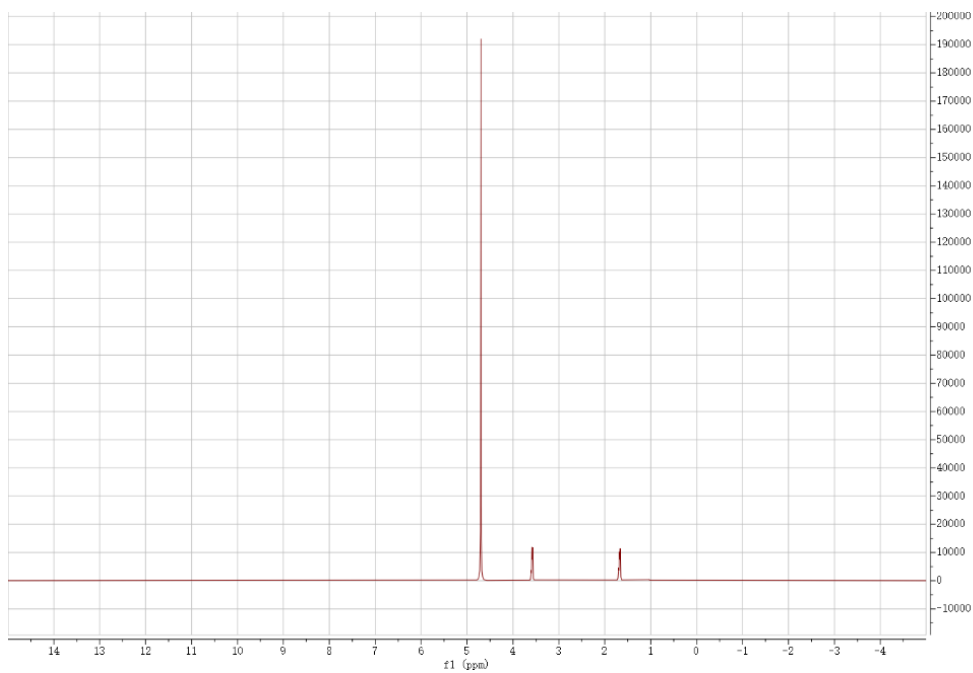
**Fig. S6**  $^1\text{H-NMR}$  spectrum of glycerol after 6 h deuteration reaction at 140 °C.



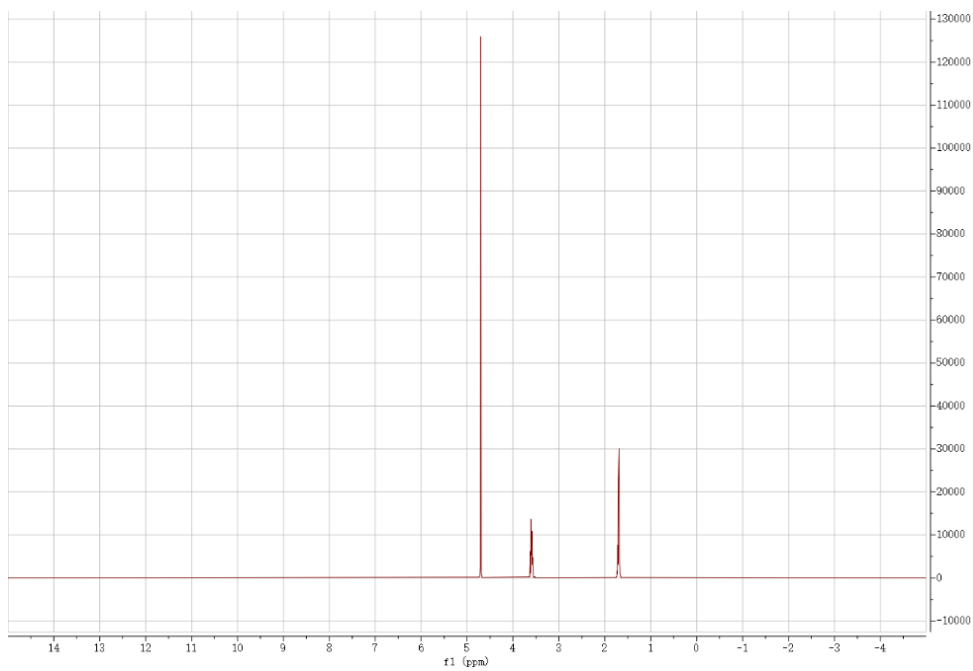
**Fig. S7**  $^1\text{H-NMR}$  spectrum of 1,3-PDO.



**Fig. S8**  $^1\text{H-NMR}$  spectrum of 1,3-PDO after 2 h deuteration glycerol hydrogenolysis reaction at 140 °C.



**Fig. S9**  $^1\text{H}$ -NMR spectrum of 1,3-PDO after 6 h deuteration glycerol hydrogenolysis reaction at 140 °C.



**Fig. S10**  $^1\text{H}$ -NMR spectrum of 1,3-PDO after 2 h deuteration 1,3-PDO hydrogenolysis reaction at 140 °C.

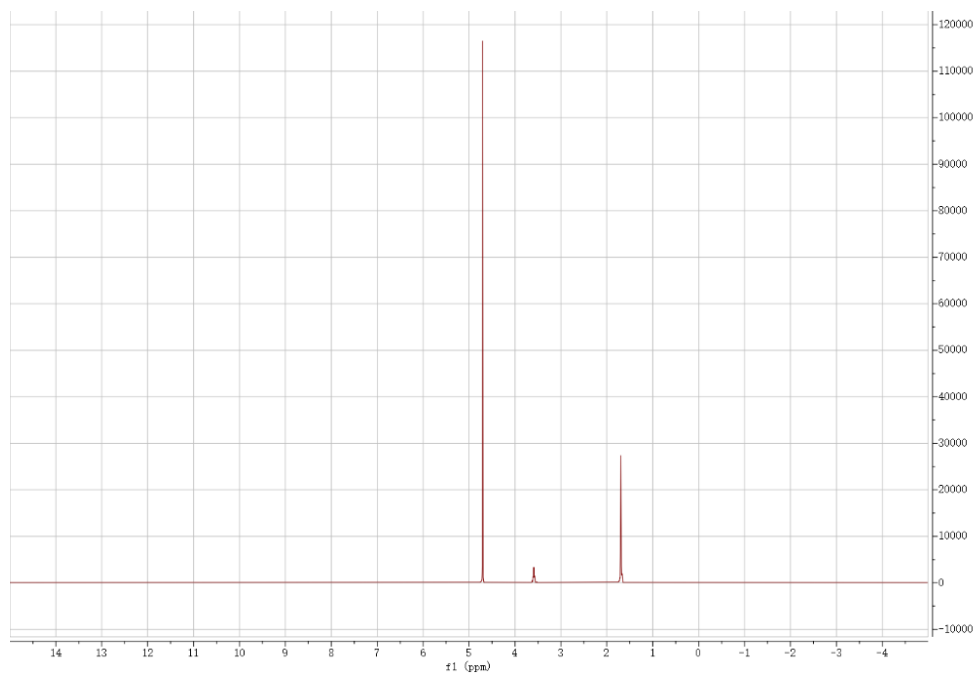
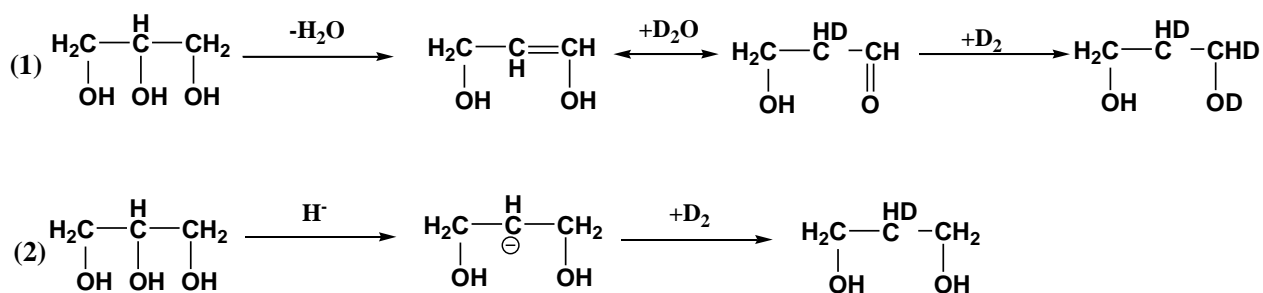


Fig. S11  $^1\text{H}$ -NMR spectrum of 1,3-PDO after 6 h deuteration 1,3-PDO hydrogenolysis reaction at 140 °C.



Scheme S1 Other proposed glycerol hydrogenolysis mechanism on Pt/WO<sub>3</sub>/TiO<sub>2</sub>.