

Supporting Information

Praseodymia-Titania Mixed Oxides Supported Gold as Efficiency Water Gas Shift Catalyst: Modulated by the Mixing Ratio of Oxides

Weixuan Zhao,^{a#} Junjie Shi,^{ab#*} Mingyue Lin,^c Libo Sun,^a Huijuan Su,^a Xun Sun,^a Toru Murayama,^{a,d,e} Caixia Qi^{a*}

^a Shandong Applied Research Centre of Gold Nanotechnology, School of Chemistry & Chemical Engineering, Yantai University, Yantai 264005, China.

^b Department of Chemical Engineering, University of Florida, Gainesville, Florida 32611, United States.

^c State Environmental Protection Key Laboratory of Environmental Risk Assessment and Control on Chemical Process, School of Resources and Environmental Engineering, East China University of Science and Technology, Shanghai 200237, China

^d Research Center for Gold Chemistry, Department of Applied Chemistry for Environment, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University, Tokyo 192-0397, Japan.

^e Research Center for Hydrogen Energy-based Society, Department of Applied Chemistry for Environment, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University, Tokyo 192-0397, Japan

[#]These authors contributed equally to this work.

* Corresponding authors: qicx@ytu.edu.cn and junjieshiding@gmail.com

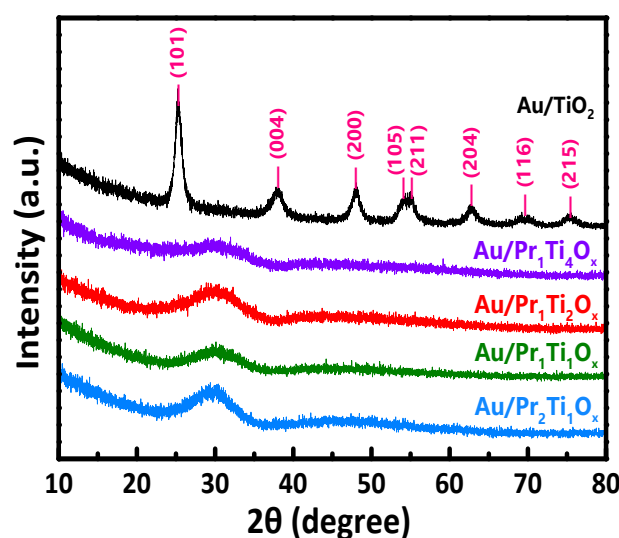


Figure S1. XRD patterns of Au/TiO₂ and Au/Pr_aTi_bO_x catalysts.

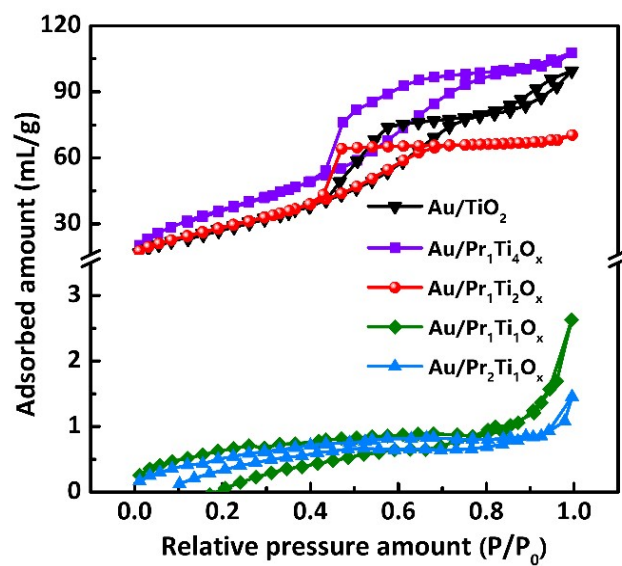


Figure S2. Nitrogen physisorption adsorption/desorption isotherms.

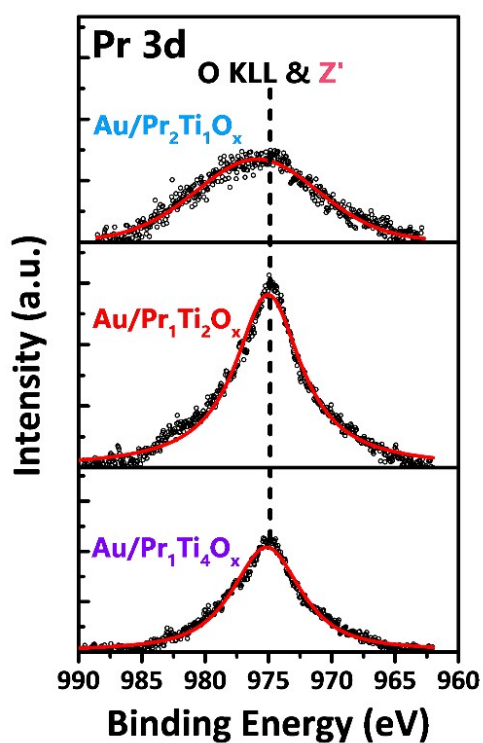


Figure S3. XPS characterization of Pr 3d in Au/Pr_aTi_bO_x catalysts after use in WGS (2 vol% CO + 10 vol% H₂O/N₂, 10 h on-stream, 150 to 400 °C).

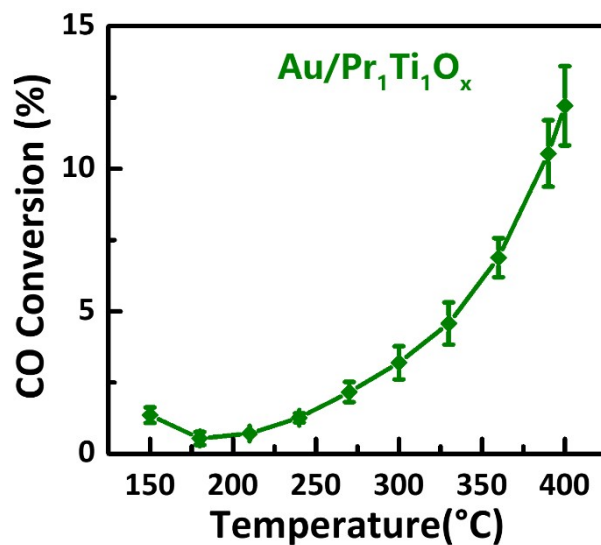


Figure S4. Steady-state test profiles of Au/Pr₁Ti₁O_x catalysts for the WGS reaction (conditions: 2 vol% CO/10 vol% H₂O/N₂, 45 mL min⁻¹, m_{catal} = 50 mg, space velocity 54000 mL h⁻¹g_{cat}⁻¹).

Sample	ICP Au loading	S _{BET} (m ² ·g ⁻¹)
Au/Pr ₁ Ti ₁ O _x	0.52	2.3

Table S1. Physicochemical properties of Au/Pr₁Ti₁O_x Catalyst.

Sample	Au species (%)		
	Au ³⁺	Au ⁺	Au ⁰
Au/TiO ₂	12.8	13.8	73.4
Au/Pr ₁ Ti ₄ O _x	11.3	18.7	70.0
Au/Pr ₁ Ti ₂ O _x	15.7	20.1	64.2
Au/Pr ₂ Ti ₁ O _x	13.4	41.7	44.9

Table S2. Compositions of the Au 4f photoelectron Lines of the Au/TiO₂ and Au/Pr_aTi_bO_x catalysts.