

Supplementary Material

Structure and Catalytic Behavior of Alumina Supported Bimetallic Au-Rh Nanoparticles in the Reduction of NO by CO

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1. X-ray photoelectron spectroscopy (XPS) of Au-Rh/Al₂O₃, Au/Al₂O₃, and Rh/Al₂O₃, catalysts

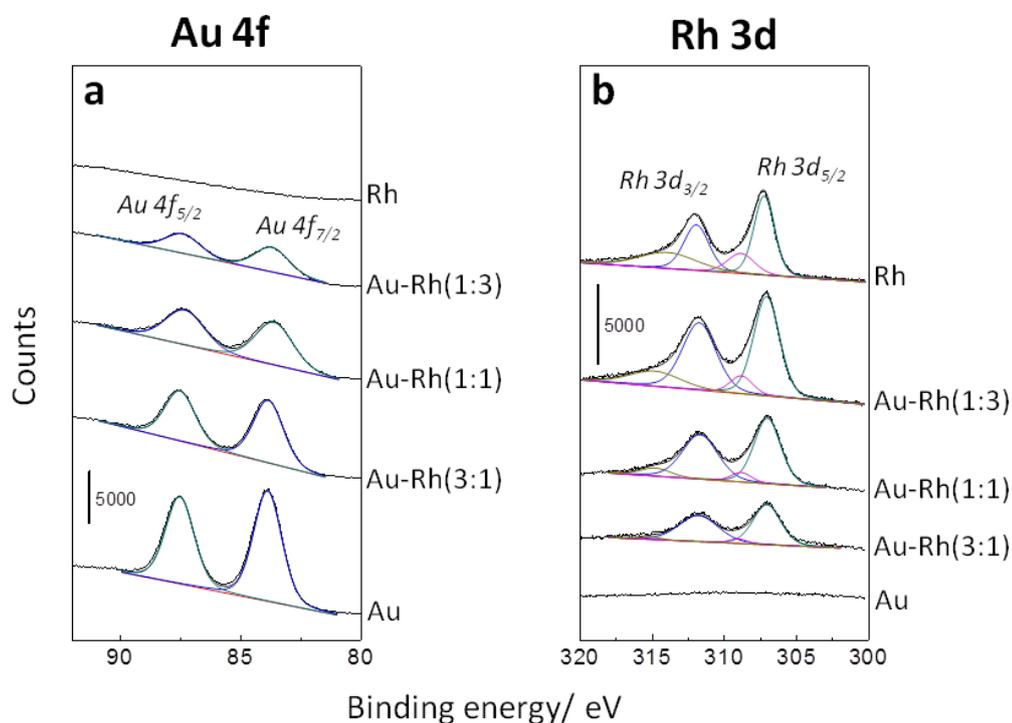


Figure S1. XPS spectra of Au/Al₂O₃, Rh/Al₂O₃, Au-Rh/Al₂O₃ catalysts with different molar ratio of Au:Rh after 3h reduction with H₂ at 300°C.

2. Catalytic performance of Au/Al₂O₃, Rh/Al₂O₃, and Au-Rh/Al₂O₃ catalysts with different molar ratio Au:Rh

Table S1. Catalytic performance in NO reduction by CO at 200 °C. Detailed conditions are specified in the Experimental section of the paper. Note that the bimetallic Au-Rh as well as the monometallic Au/Al₂O₃ catalyst only produced N₂O at the given conditions.

Catalyst	NO conversion / %	N ₂ selectivity / %
Rh/Al ₂ O ₃	32	66
Au-Rh(1:3)/Al ₂ O ₃	24	0
Au-Rh(1:1)/Al ₂ O ₃	18	0
Au-Rh(3:1)/Al ₂ O ₃	17	0
Au/Al ₂ O ₃	14	0

3. DRIFTS spectra of NO and CO co-adsorption

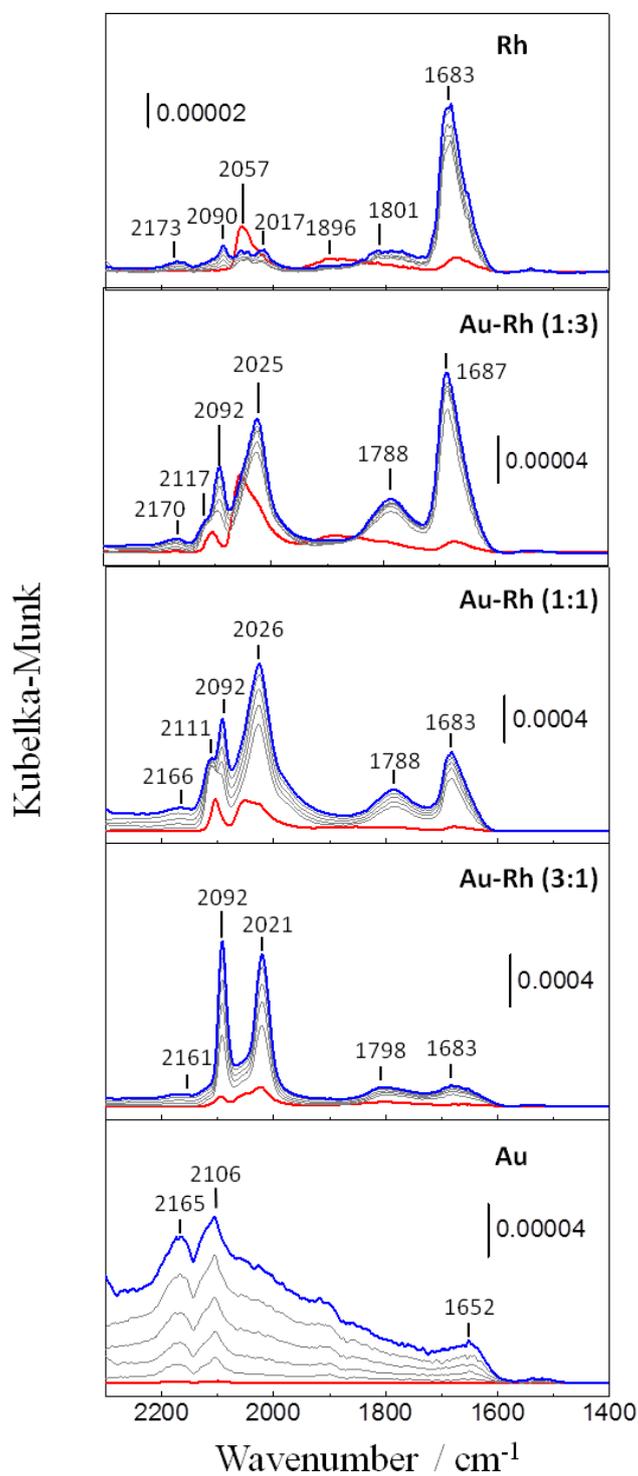


Figure S2. In situ DRIFTS spectra measured during NO and CO coadsorption on Au/ Al_2O_3 , Rh/ Al_2O_3 , Au-Rh/ Al_2O_3 catalysts with different molar ratio of Au:Rh at 30 °C. Conditions are specified in the Experimental section of the paper.

4. Reactivity of isocyanate species

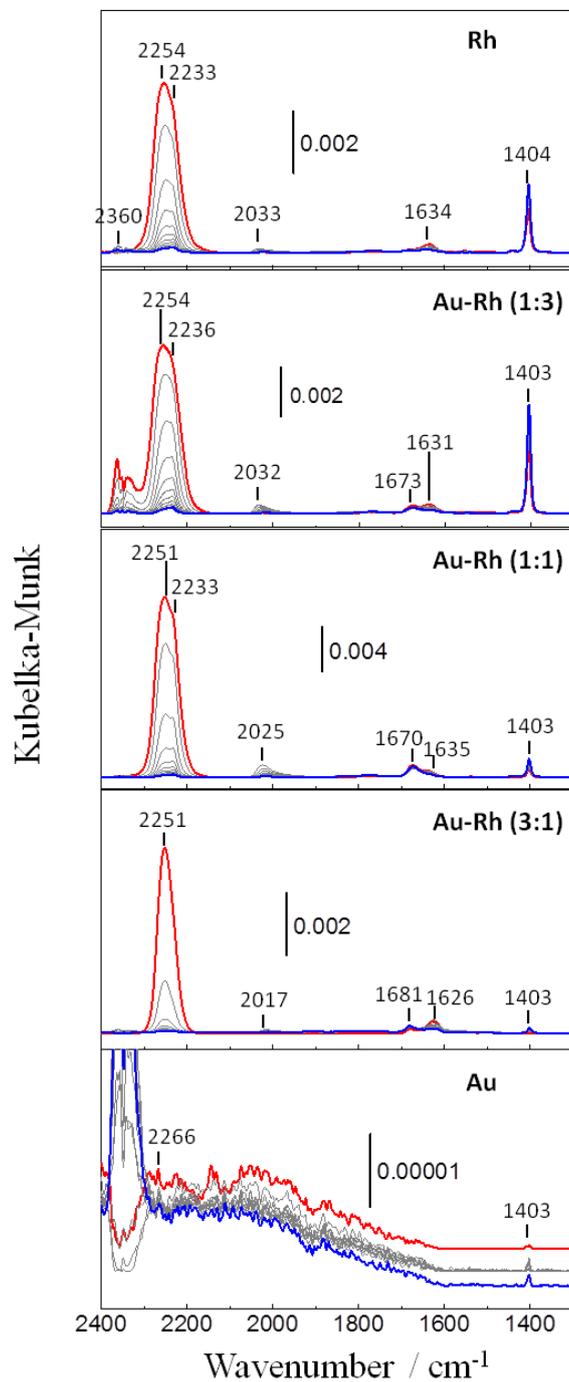


Figure S3. In situ DRIFTS spectra during NO introduction following NO-CO reaction at 300 °C for 10 min on Au/ Al_2O_3 , Rh/ Al_2O_3 , and Au-Rh/ Al_2O_3 catalysts with different molar ratio of Au:Rh. Conditions are specified in the Experimental section of the paper.

5. XPS of Au-Rh (1:1)/Al₂O₃-CeO_x catalysts

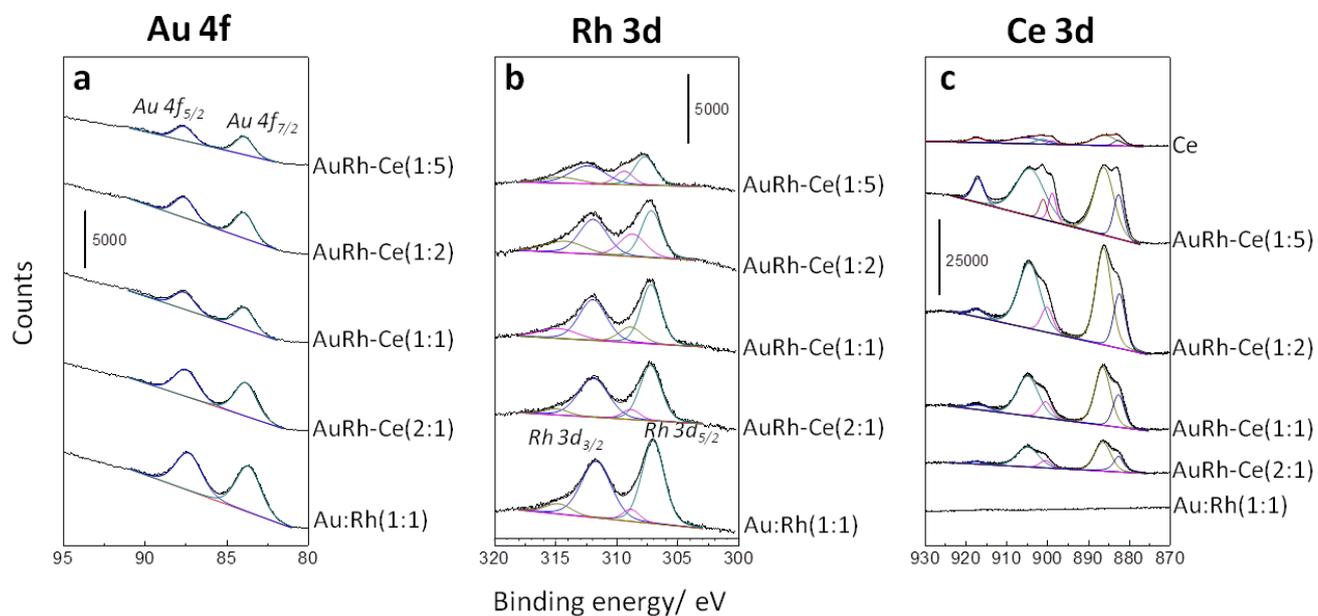


Figure S4. XPS spectra of Au-Rh (1:1)/Al₂O₃, CeO_x/Al₂O₃ and AuRh-CeO_x/Al₂O₃, catalysts with different molar ratio of AuRh:Ce. after 3h reduction with H₂ at 300°C.

6. Temperature programmed reduction (H₂-TPR) of ceria-promoted Au-Rh-Ce catalysts

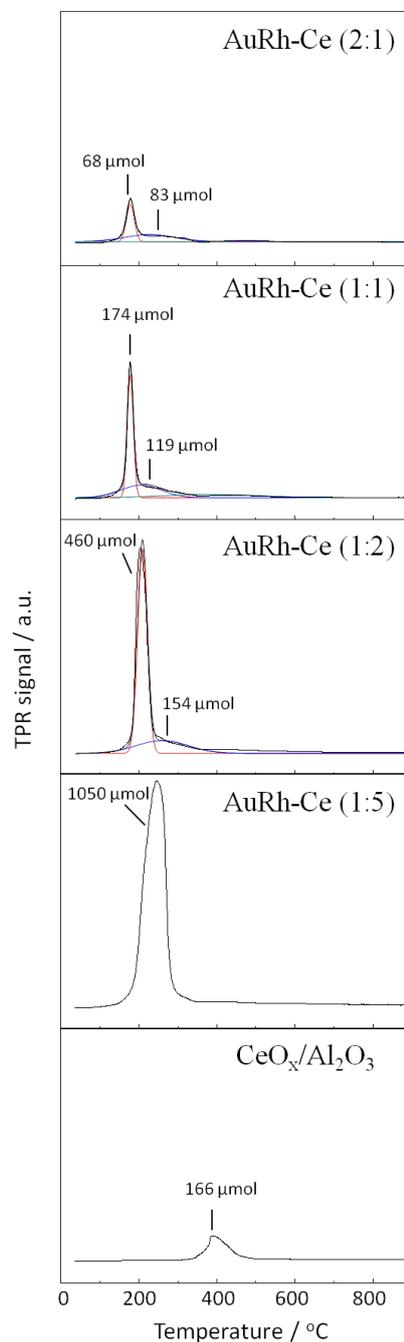


Figure S5. H₂-TPR profiles of CeO_x/Al₂O₃ and AuRh-CeO_x/Al₂O₃ catalysts with different molar ratio of AuRh:Ce. Conditions: catalyst weight: 100 mg, gas mixture: 10 Vol% H₂ in Ar balance, ramping rate: 10 °C/min, total flow rate: 15 mL/min. Numbers assigned to profiles represent the amount of hydrogen consumed (μmol/g-catalyst) in the corresponding deconvoluted signals.

7. Catalytic performance of CeO_x-promoted AuRh-Ce(1:1)Al₂O₃

Table S2. Catalytic performance of ceria-promoted Au-Rh(1:1)/alumina catalysts in NO reduction by CO at 200 °C. Detailed conditions are specified in the Experimental section of paper. Note that N₂ and N₂O were the only products. The data of Au-Rh(1:1)/Al₂O₃ and CeO_x/Al₂O₃ reference catalysts are listed for comparison.

Catalyst	NO conversion / %	N ₂ selectivity / %
Au-Rh(1:1)/Al ₂ O ₃	18	0
AuRh-Ce(2:1)/Al ₂ O ₃	24	0
AuRh-Ce(1:1)/Al ₂ O ₃	27	69
AuRh-Ce(1:2)/Al ₂ O ₃	32	45
AuRh-Ce(1:5)/Al ₂ O ₃	36	41
CeO _x /Al ₂ O ₃	10	0

8. DRIFTS spectra of NO and CO co-adsorption

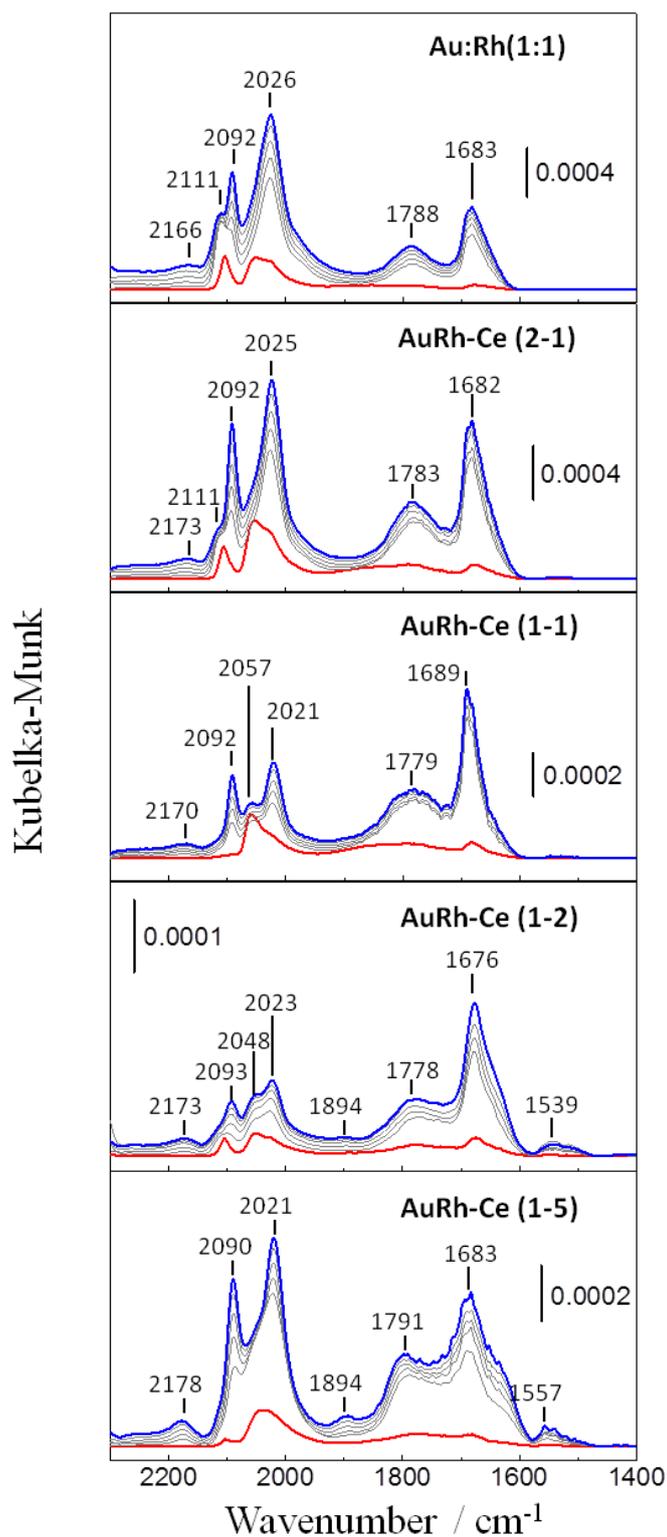


Figure S6. In situ DRIFTS spectra measured during NO and CO co-adsorption on Au-Rh(1:1)/Al₂O₃, and AuRh-CeO_x/Al₂O₃, catalysts with different molar ratio of AuRh:Ce at 30 °C. Conditions are specified in the Experimental section of the paper.

9. Reactivity of isocyanate species by switching the gas stream from NO and CO to only NO

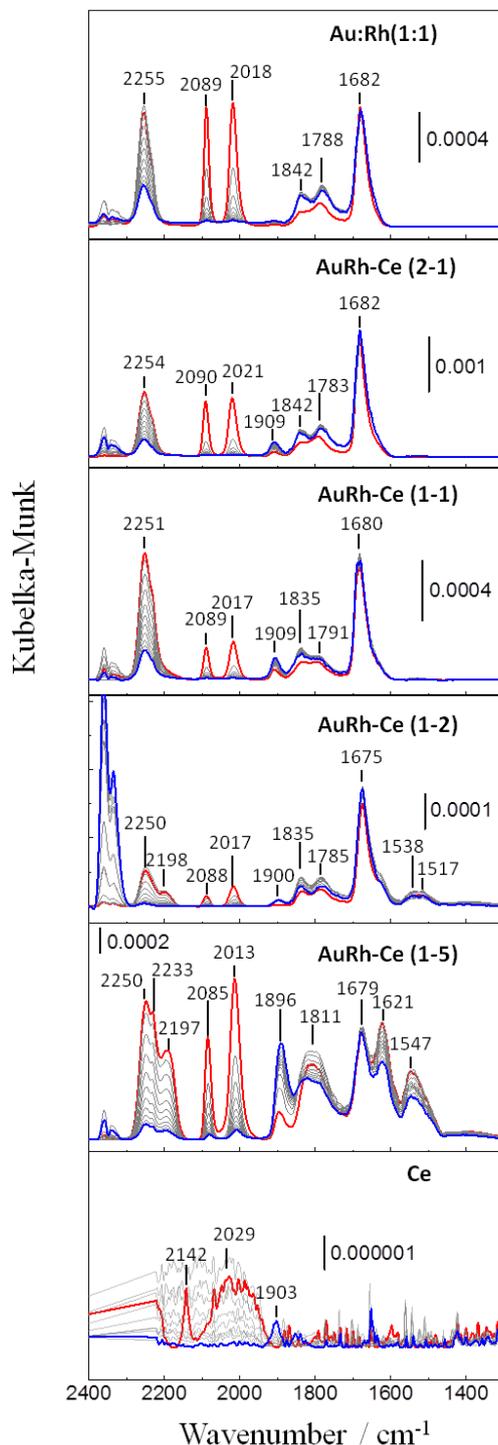


Figure S7. In situ DRIFTS spectra during NO introduction following NO-CO reaction at 300 °C for 10 min on Au-Rh(1:1)/Al₂O₃, CeO_x/Al₂O₃ and AuRh-CeO_x/Al₂O₃, catalysts with different molar ratio of AuRh:Ce. Conditions are specified in the Experimental section of the paper.