catalysts
MDPI

Supporting Information

Higher Activity of Ni/γ-Al_2O_3 over Fe/γ-Al_2O_3 and Ru/γ-Al_2O_3 for Catalytic Ammonia Synthesis in Nonthermal Atmospheric-Pressure Plasma of N_2 and H_2

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Table S1. The properties and catalytic activities for the plasma reaction of various aluminas.

Crystal structure	Surface area / $m^2\ g^{-1}$	Weight in experiment / g	Surface area in experiment [a] / m^2	Catalytic activity [b] / $\mu mol\ min^{-1}$	Supplier, Catalog No.
α	4.7	5.63	26.5	66.0	Fujifilm Wako Pure Chemical Co. Japan
θ	108.5	2.32	251.7	87.6	Catal. Soc. Japan JRC-ALO10
γ	200.1	2.73	546.3	78.3	Strem Chemical Inc., USA
γ	238.3	3.83	912.7	76.2	Kanto Chemical. Co., Japan
θ + γ	154.7	3.12	482.7	76.3	Sumitomo Chemical Co. Japan. KHA-46
θ + γ	162.1	2.77	449.0	79	Sumitomo Chemical Co. Japan. KHS-46
θ + γ	254.1	2.93	744.5	70.3	Sumitomo Chemical Co. Japan. NKHD-26
θ + γ	149.6	2.74	409.9	78.3	Sumitomo Chemical Co. Japan. NKHO-26
θ + γ	168.7	1.97	332.3	79.2	Catal. Soc. Japan JRC-ALO6
θ + γ	413.6	2.51	1038.1	64.4	Catal. Soc. Japan JRC-ALO8

a) product of surface area and weight in experiment.

b) Reaction conditions: applied voltage, 6 kV; frequency, 50 kHz; electrode length, 150 mm; total flow rate,

100 mL min^{-1}; and $H_2/N_2 = 1$.

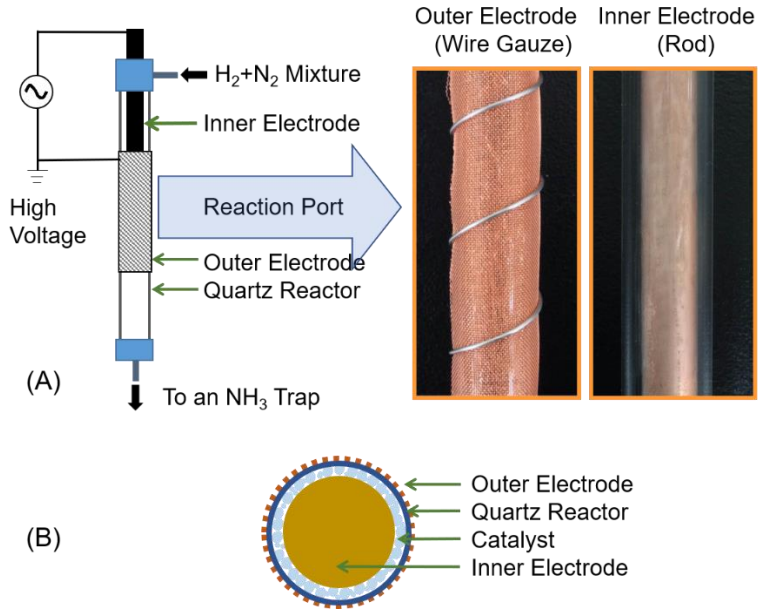

Figure S1. Overall view (A) and sectional view (B) of the reactor used in the current plasma experiments. The quartz reactor was equipped with an outer electrode of a copper net and an inner electrode of a copper rod. The waveforms of applied voltage and current are summarized in Figure S2.

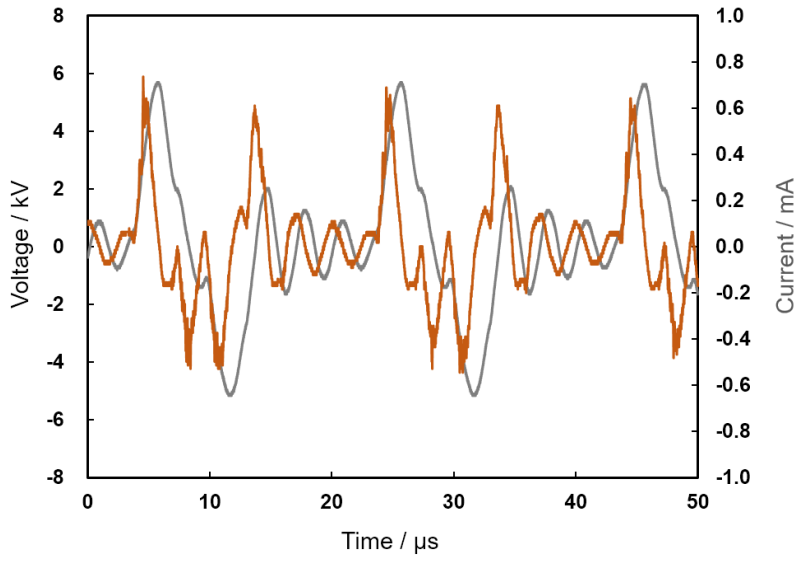

Figure S2. Waveforms of voltage (gray) and current (brown) applied for the blank experiment (a copper rod alone). Reaction conditions: applied voltage, 6 kV; frequency, 50 kHz; electrode length, 150 mm; total flow rate, 100 mL min-1; $H_2/N_2 = 1$.

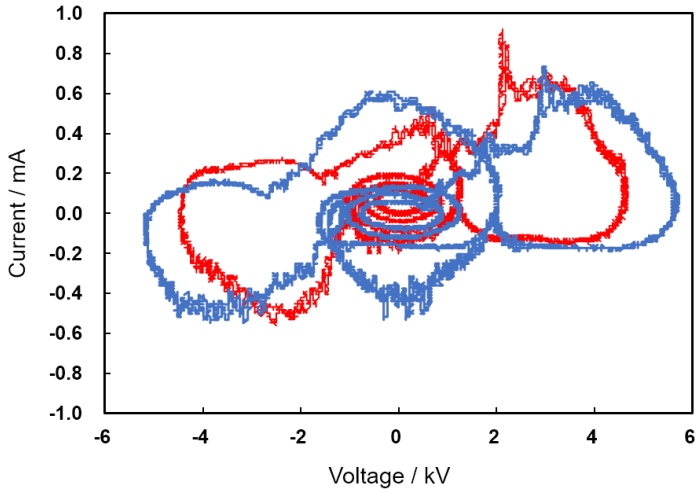

Figure S3. The Lissajous curves of V(t) and I(t) for the plasma reactions on a copper rod alone (the blank experiment, blue) and on Ni/Al_2O_3(KC, 773) (red). Reaction conditions: applied voltage, 6 kV; frequency, 50 kHz; electrode length, 150 mm; total flow rate, 100 mL min^{-1}; and $H_2/N_2 = 1$.