

An *operando* study on automobile catalytic converter

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Dynamic behavior of Rh species of 1 wt% Rh/Al₂O₃ catalyst during three-way catalytic reaction (catalyst 200 mg, CO 1000 ppm, NO 1000 ppm, C₃H₆ 250 ppm, O₂ 912.5 – 1337.5 ppm, He balance, 100 mL min⁻¹, 673 K) was examined using a micro gas chromatograph (GC), a NO_x meter, a quadrupole mass spectrometer (Q-Mass), and time-resolved quick XAS measurement *operando* at BL01B1, SPring-8, Japan. The data (Figure 1) suggest different surface rearrangement behavior, random reduction process and autocatalytic oxidation process of Rh species at the gas switching from reductive atmosphere to oxidative atmosphere and vice versa. [1]

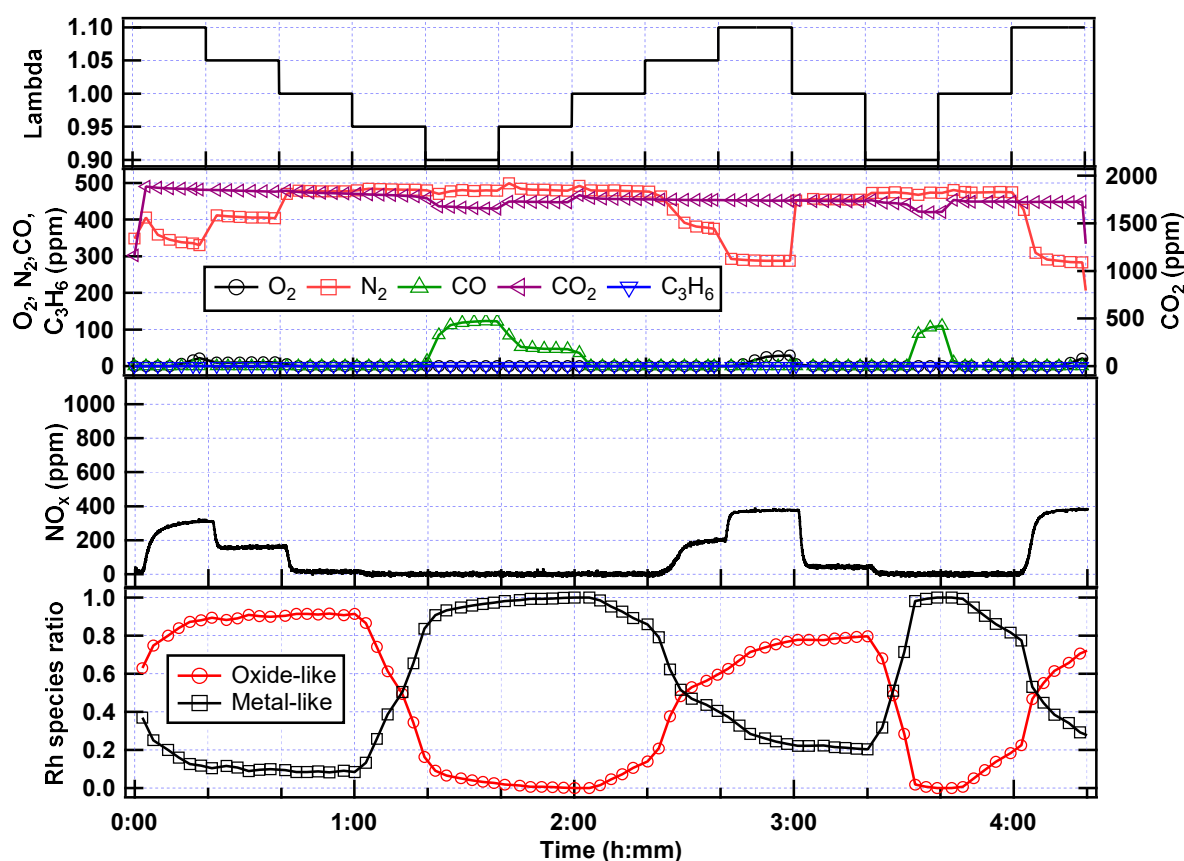


Figure 1. GC and NO_x profiles of the eluent gases of three-way catalytic reaction over 1 wt% Rh/Al₂O₃ during *operando* XAS measurement and λ , the O₂ concentration indicator.

($\lambda = ([\text{NO}]_a + [\text{CO}]_a + [\text{O}_2]_a \times 2) / ([\text{NO}]_s + [\text{CO}]_s + [\text{O}_2]_s \times 2)$, where $[X]_y$ is the concentration of X at the actual ($y=a$) or stoichiometric ($y=s$) condition.)

Bibliography

[1] H. Asakura, S. Hosokawa, T. Ina, K. Kato, K. Nitta, K. Uera, T. Uruga, H. Miura, T. Shishido, J. Ohyama, A. Satsuma, K. Sato, A. Yamamoto, S. Hinokuma, H. Yoshida, M. Machida, S. Yamazoe, T. Tsukuda, K. Teramura, and T. Tanaka; *J. Am. Chem. Soc.*, *accepted*.