Supplementary Material

Insights into Pt-CN Species on an Alumina-supported Platinum Catalyst as Active Intermediates or Inhibitors for Low-temperature Hydrogen Cyanide Synthesis from Methane and Nitric Oxide

Atsushi Takagaki,*[a] Kyoko K. Bando,*[b] Tatsuya Yamasaki,[c] Junichi Murakami,[b] Nobuya Suganuma,[d] I. Tyrone Ghampson,[d] Tetsuya Kodaira,[e] Tatsumi Ishihara,[c,f] and Tetsuya Shishido*[d,g]

[a] *Division of Materials and Chemical Engineering, Faculty of Engineering, Yokohama National University, 79-5 Tokiwadai, Hodogaya-ku, Yokohama, Kanagawa 240-8501, Japan.*

[b] *Nanomaterials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), 1-1-1, Higashi, Tsukuba, Ibaraki 305-8565, Japan.*

[c] *Department of Applied Chemistry, Faculty of Engineering, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan.*

[d] *Department of Applied Chemistry for Environment, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University, 1-1 Minami-osawa, Hachioji, Tokyo 192-0397, Japan.*

[e] *Research Institute for Chemical Process Technology, National Institute of Advanced Industrial Science and Technology (AIST), 1-1-1, Higashi, Tsukuba, Ibaraki 305-8565, Japan.*

[f] *International Institute for Carbon-Neutral Energy Research (WPI-I²CNER), Kyushu University, 711 Motooka, Nishi-ku, Fukuoka 819-0395, Japan.*

[g] *Elements Strategy Initiative for Catalysts and Batteries, Kyoto University, 1-30 Goryo-Ohara, Nishikyo-ku, Kyoto 615-8245, Japan.*

E-mail: takagaki-atsushi-gw@ynu.ac.jp, k.k.bando@aist.go.jp, shishido-tetsuya@tmu.ac.jp

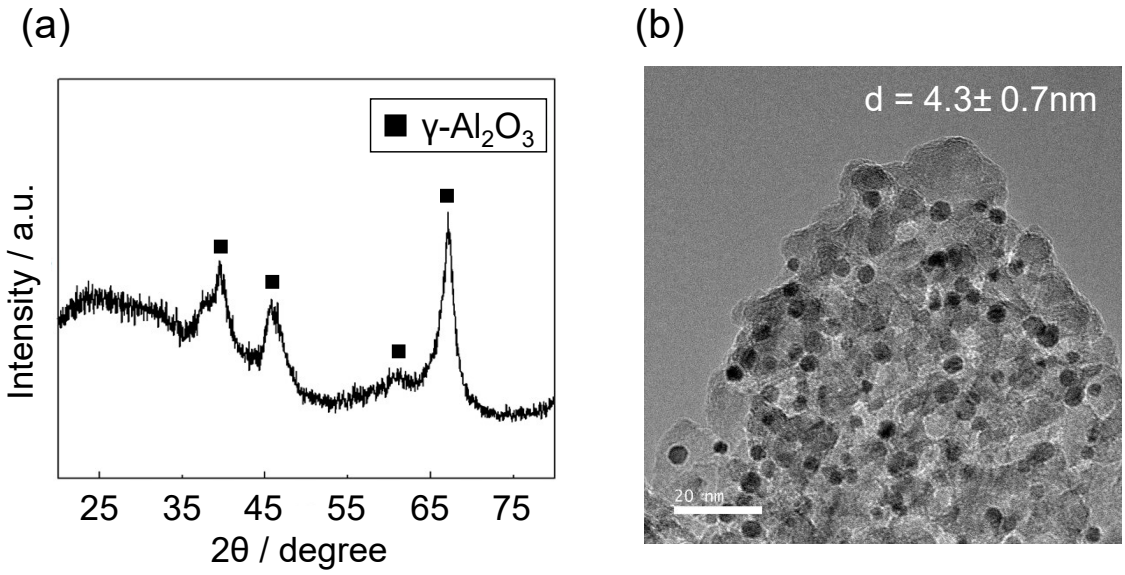

Figure S1. XRD pattern (a) and TEM image (b) of 5wt%Pt/Al_2O_3.

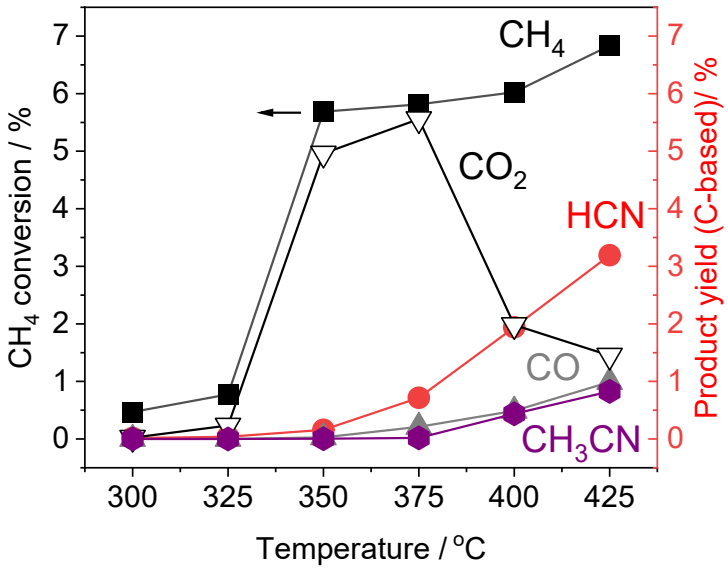

Figure S2. Methane conversion and product yield (C-based) as a function of reaction temperature for the reaction of methane with nitric oxide over Pt/Al_2O_3 catalyst. Reaction conditions: 5wt% Pt/Al_2O_3 (100 mg), CH_4: NO: He = 13.4: 1.8: 84.8 (total flow rate: 100 mL min^{-1}), and 0.1 MPa.