

Supplementary Materials

Activation Phenomenon in Methane Combustion Reaction over Pd/ZrO₂ Catalysts

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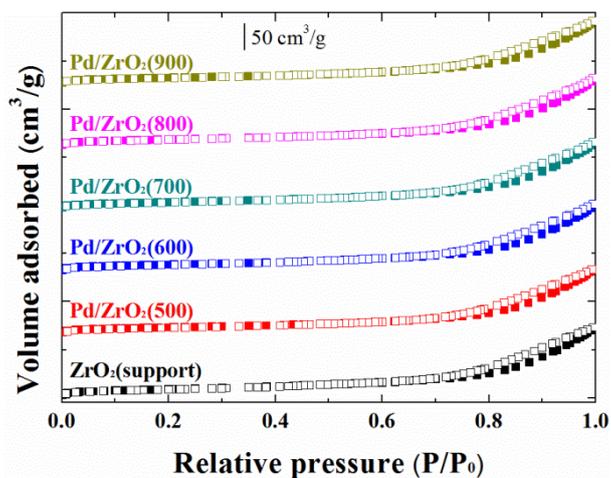


Figure S1. N₂-sorption isotherms of ZrO₂ support and Pd/ZrO₂(x) catalysts. X in parenthesis means calcination temperature in Celsius degree.

Table S1. The quantitative results obtained from cyclic temperature-programmed reactions over Pd/ZrO₂(700) catalyst

Number of cycles	T ₅ (°C)	T ₅₀ (°C)	T ₈₀ (°C)
1st	388	436	457
2nd	364	423	448
3rd	364	423	446

* T₅, T₅₀, and T₈₀ were calculated from the heating cycles.

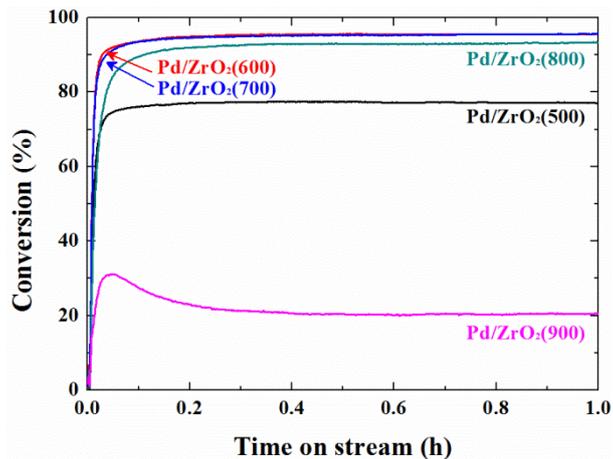


Figure S2. Methane conversion of Pd/ZrO₂(x) catalysts during activation period at 500 °C for 1 h.

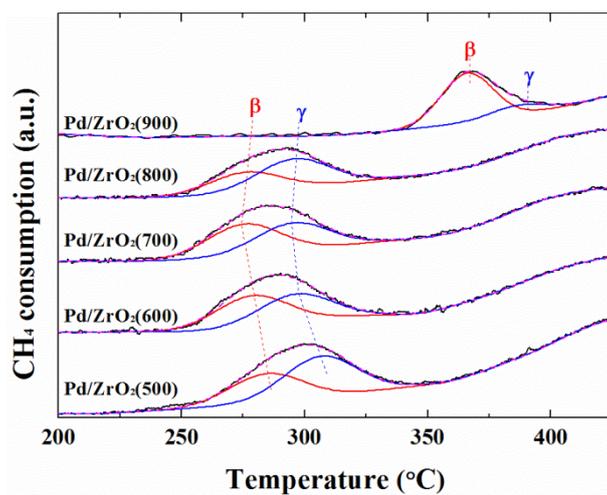


Figure S3. CH₄-TPR profiles of activated Pd/ZrO₂(x) catalysts being deconvoluted into two different reduction peaks.

Table S2. Quantitative results calculated from CH₄-TPR over activated Pd/ZrO₂(x) catalysts in Fig. S3

Sample	Peak position (°C) (Relative portion, %)	
	β	γ
Pd/ZrO ₂ (500)	284.5 (41.3)	306.6 (58.7)
Pd/ZrO ₂ (600)	278.7 (52.6)	296.5 (47.4)
Pd/ZrO ₂ (700)	275.4 (53.0)	295.2 (47.0)
Pd/ZrO ₂ (800)	276.1 (41.0)	295.4 (59.0)
Pd/ZrO ₂ (900)	356.6 (34.2)	369.9 (65.8)