

Ceria Crystal Facet Impact for Methane C–H Activation in Pd/CeO₂ Catalysts

Supporting information

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Table S1 The corresponding relationships between the characteristic peaks and the ceria crystal facets^{1,2}

XRD peak position	Corresponding ceria facets
28.6°	(111)
33.1°	(200)
47.5°	(220)
56.3°	(311)
59.1°	(222)
69.4°	(400)
76.7°	(331)
79.1°	(420)

Table S2 The corresponding relationships between the Ce 3d XPS peaks and the valence³⁻⁵

Peak	Binding energy (eV)	Valence state
V ⁰	880.9	Ce ³⁺
V'	885.2	Ce ³⁺
U ⁰	898.5	Ce ³⁺
U'	903.6	Ce ³⁺
V	882.6	Ce ⁴⁺
V''	888.9	Ce ⁴⁺
V'''	898.6	Ce ⁴⁺
U	901.2	Ce ⁴⁺
U''	907.5	Ce ⁴⁺
U'''	916.9	Ce ⁴⁺

Table S3. The CH₄ conversion of synthesized catalysts at 215 °C for two GHSV.

Catalyst	Conversion-90k (%)	Conversion-200k (%)
CP-nanorods	10.83	4.69
CP-nanocubes	9.14	3.81
CP-polyhedral	3.38	1.49

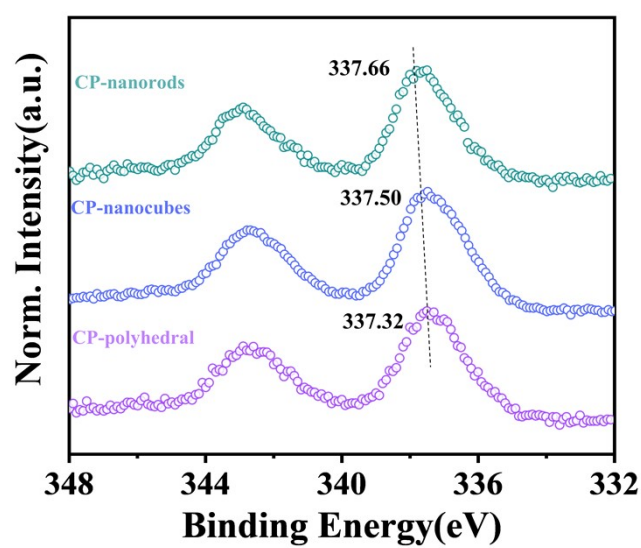


Figure S1. The XPS of Pd 3d

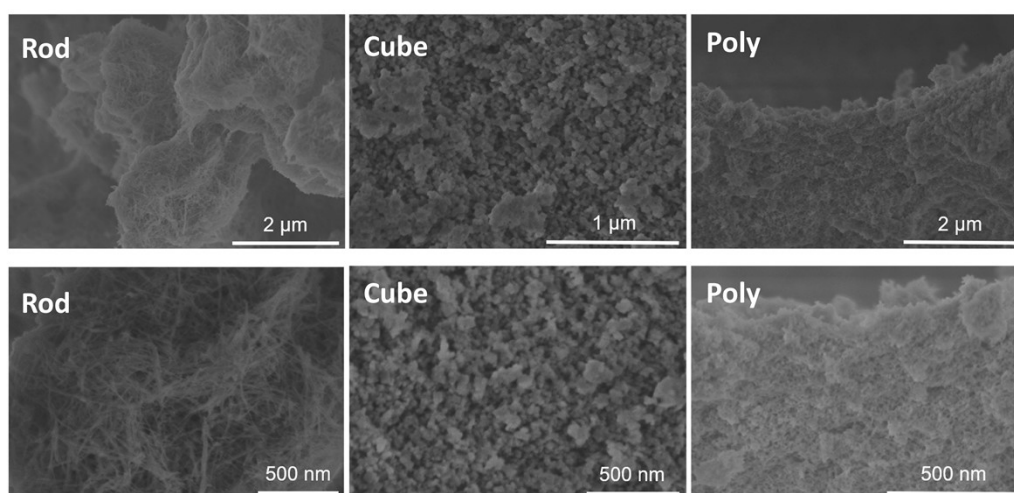


Figure S2. The SEM image of Pd/CeO₂ catalysts

References

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