

ELECTRONIC SUPPLEMENTARY INFORMATION (ESI)

Promoting effect of ceria on the performance of NiPd/CeO₂-Al₂O₃ catalysts for the selective hydrogenation of 1,3-butadiene in the presence of 1-butene

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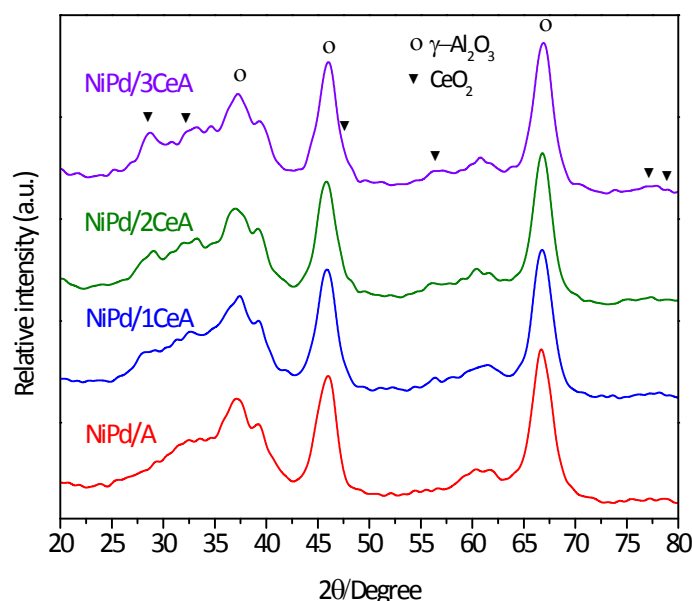


Figure S1. X-ray diffraction patterns of (CeO₂)-Al₂O₃-supported NiPd catalysts.

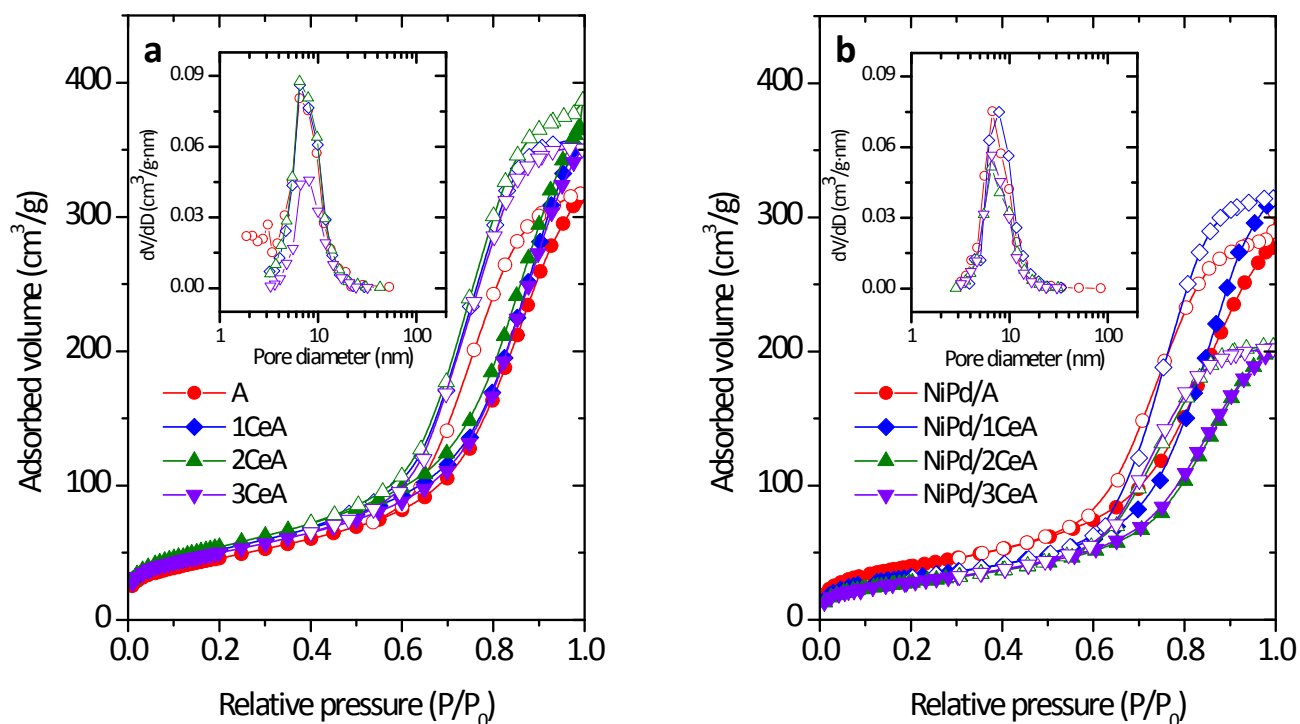


Figure S2. N₂ physisorption isotherms and pore size distributions: (a) supports and (b) catalysts.

Table S1. Ammonia desorbed amount determined from NH₃-TPD results.

Catalyst	Zone I: 40 – 400 °C (μmol/m ²)	Zone II: 400 – 500 °C (μmol/m ²)	Total (μmol/m ²)
NiPd/A	3.57	1.16	4.73
NiPd/1CeA	3.18	1.07	4.25
NiPd/2CeA	3.14	1.04	4.18
NiPd/3CeAl	3.09	1.03	4.12

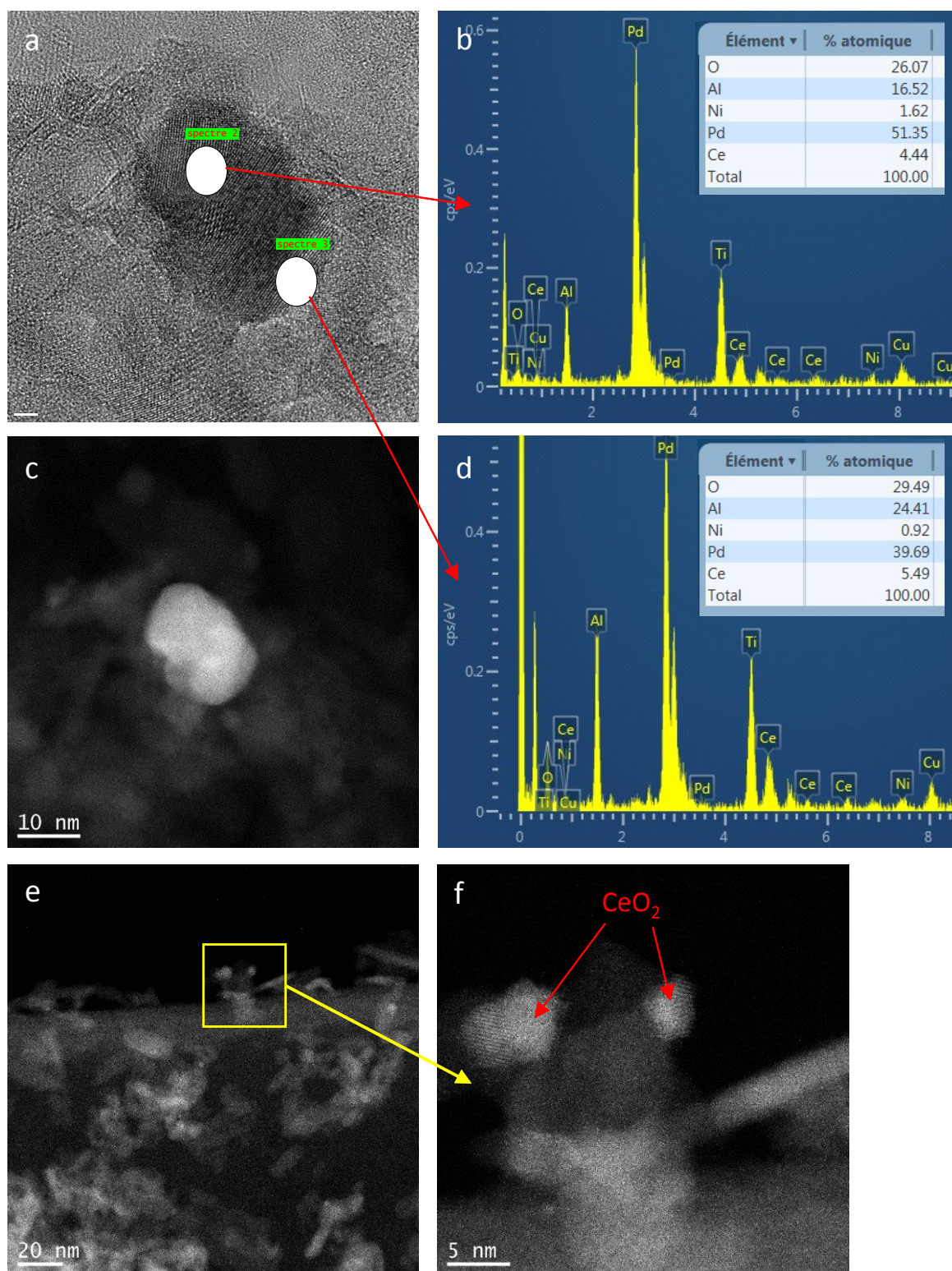


Figure S3. (a-d) TEM image, STEM-HAADF image and EDX spectra of the same NiPdCe aggregate in sample NiPd/3CeA. (e, f) STEM-HAADF images of other areas of the same sample showing pure ceria nanoparticles.

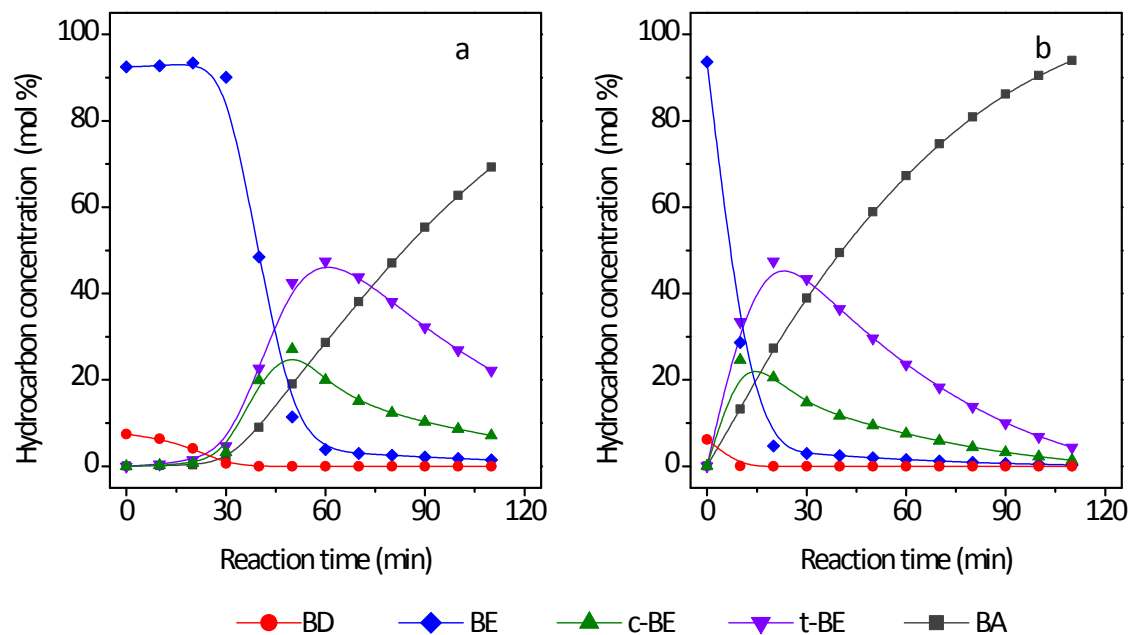


Figure S4. Evolution of the hydrocarbon concentrations during two successive runs under gas-phase conditions using the NiPd/A catalyst. (a) First run and (b) Second run. *Reaction components:* BD = 1,3-butadiene; BE = 1-butene; c-BE = *cis*-2-butene; t-BE = *trans*-2-butene; BA = butane. *Reaction conditions:* T = 25 °C, initial reactants pressure: 0.1 mbar BD, 2.0 mbar BE, 2.0 mbar H₂.

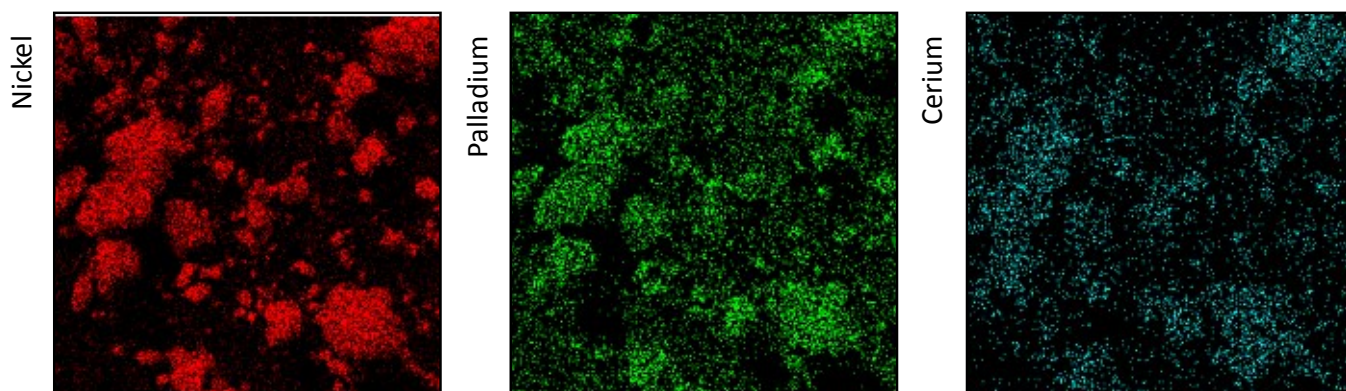


Figure S5. Elemental distributions of a typical Ce-containing catalyst (NiPd/3CeAl) ground into a powder.

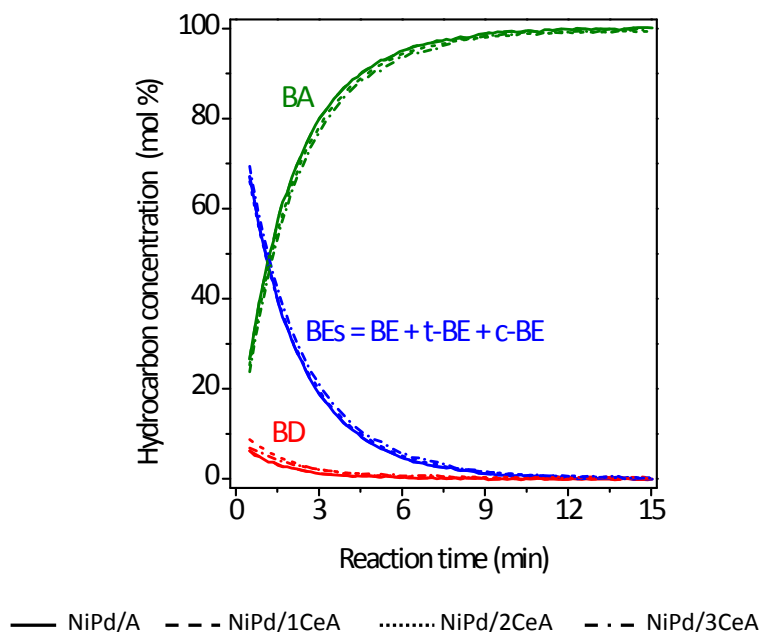


Figure S6. Evolution of hydrocarbon concentrations as a function of reaction time under gas-phase conditions using $(\text{CeO}_2\text{-})\text{Al}_2\text{O}_3$ -supported NiPd catalysts heated to 400 °C under UHV. *Reaction components:* BD = 1,3-butadiene; BE = 1-butene; c-BE = *cis*-2-butene; t-BE = *trans*-2-butene; BA = butane. *Reaction conditions:* T = 25 °C, initial reactants pressure: 0.1 mbar BD, 2.0 mbar BE, 2.0 mbar H_2 .