Article

Support effect on the performance of Ni_2P catalysts in the hydrodeoxygenation of methyl palmitate

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Supplementary Materials

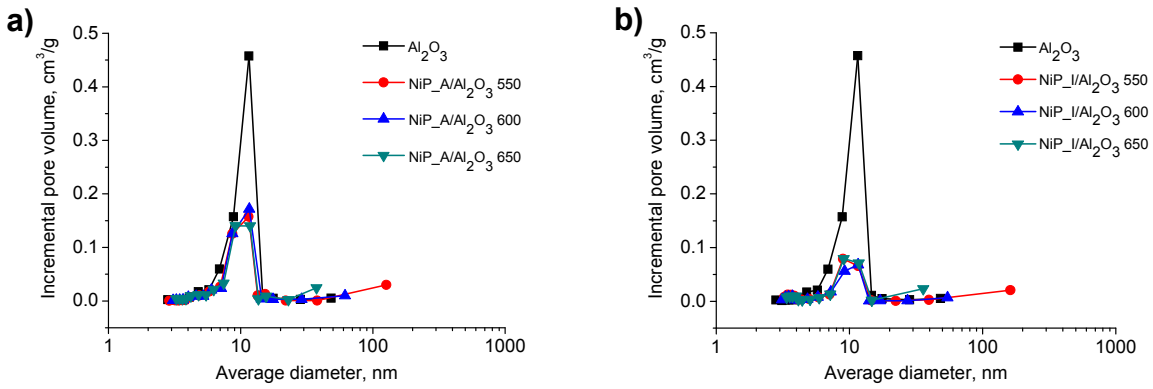

Figure S1. Pore size distributions determined from the desorption branch of N_2 isotherm for **(a)** NiP_A/Al_2O_3 and **(b)** NiP_I/Al_2O_3 catalysts reduced at 550, 600 and 650 °C as well as for Al_2O_3 support.

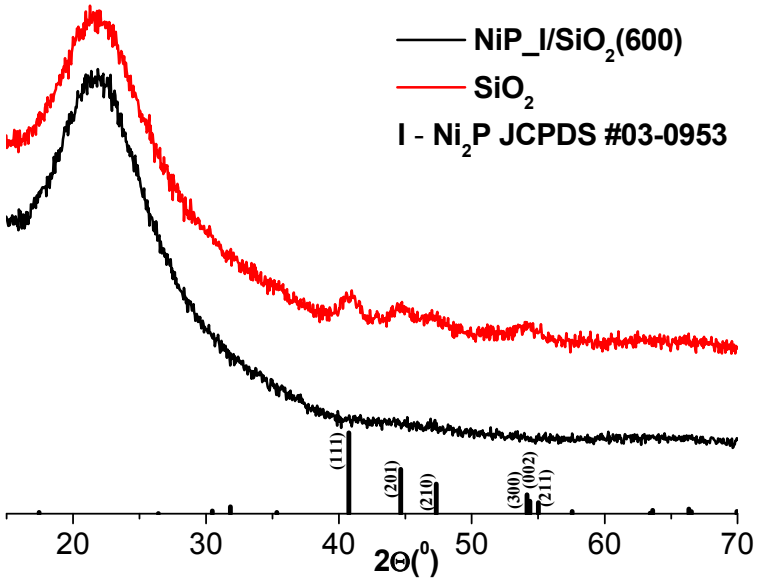

Figure S2. XRD patterns of NiP_I/SiO_2(600) catalyst prepared from phosphite precursor and reduced at temperature of 600 °C and SiO_2 support.

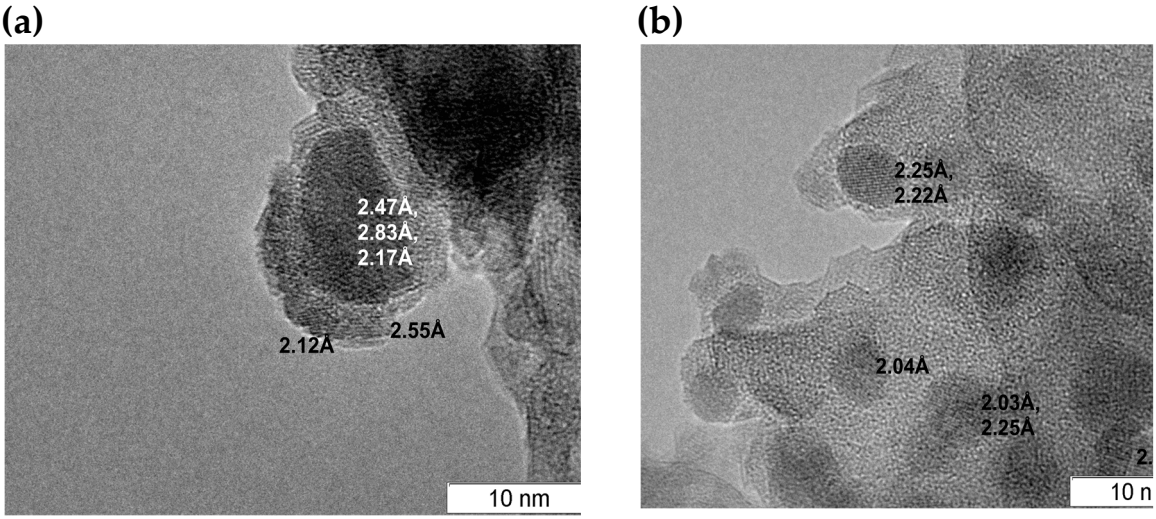

Figure S3. TEM images of Ni_xP_y/γ-Al_2O_3 catalysts prepared from different precursors: (**a**) NiP_A/Al_2O_3 650 and (**b**) NiP_I/Al_2O_3 600.

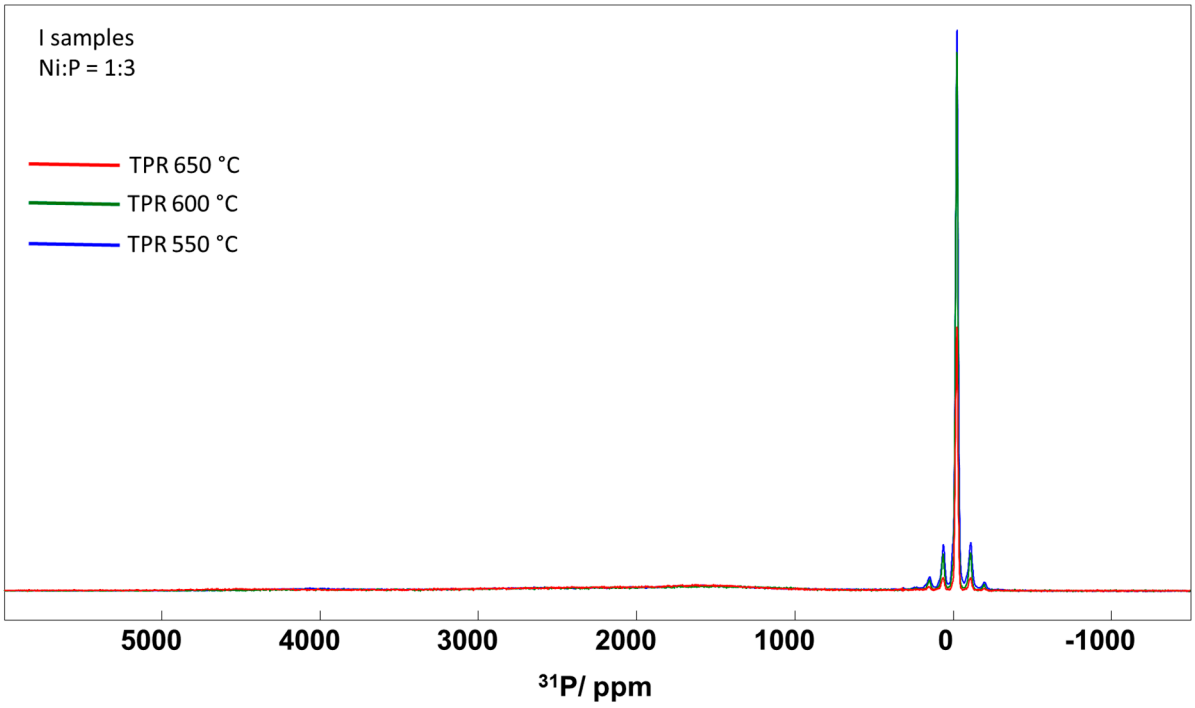

Figure S4. Full-scale mass-normalized 14 kHz MAS ^{31}P spectra of NiP_I/Al_2O_3 reduced at 550, 600 and 650 °C. A significant decrease in intensity of the line corresponding to PO_x groups can be observed for the sample reduced at 650 °C.

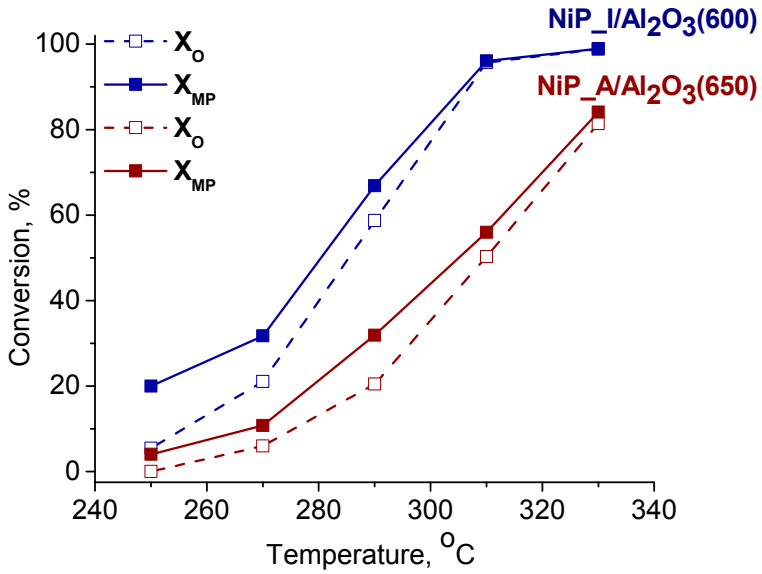

Figure S5. Temperature effect on the conversion of methyl palmitate (solid symbols, solid lines) and oxygen-containing compounds (empty symbol, dash lines) over NiP_A/Al_2O_3 650 and NiP_I/Al_2O_3 600 catalysts (P_{H2} = 3.0 MPa, T = 250–330 °C, H_2/feed = 600 Nm^3/m^3, methyl palmitate LHSV = 9 h^{-1}).

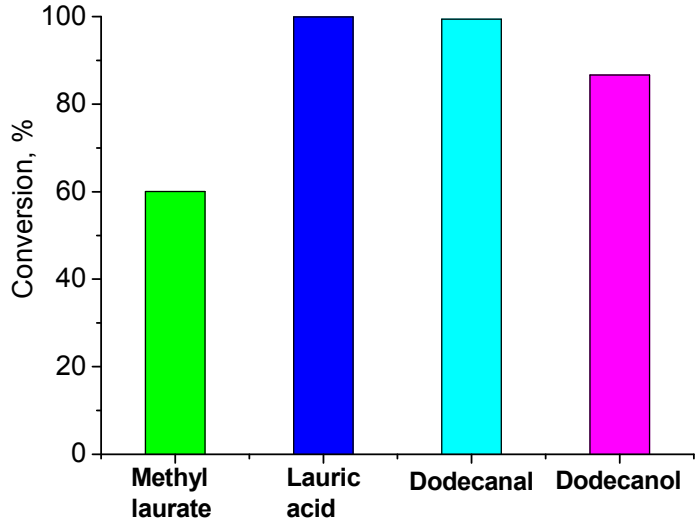

Figure S6. Conversions of methyl laurate, lauric acid, dodecanal and dodecanol over Ni_2P/SiO_2 catalyst at T = 290 °C, P_{H2} = 3.0 MPa, H_2/feed = 600 Nm^3/m^3 and reagent LHSV = 10.7 h^{-1}. Feed composition: ***1*** – 8.0 wt% of methyl laurate and 0.5 wt% of *n*-ocatane in *n*-decane; ***2*** – 7.6 wt% of lauric acid and 0.5 wt% of *n*-ocatane in *n*-decane; ***3*** – 7.0 wt% of dodecanal and 0.5 wt% of *n*-ocatane in *n*-decane; ***4*** – 7.1 wt% of dodecanol-1 and 0.5 wt% of *n*-ocatane in *n*-decane.

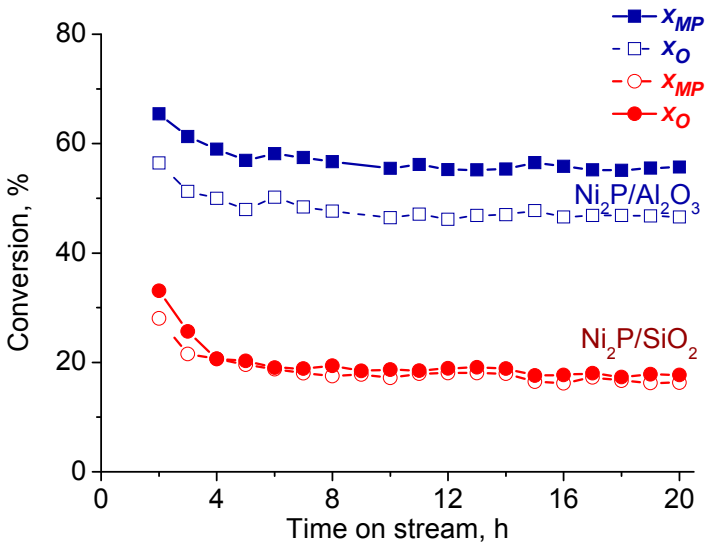

Figure S7. MP conversion (X_{MP}) and total oxygen-containing compounds conversion (X_O) as a function of time on stream for Ni_2P/Al_2O_3 and Ni_2P/SiO_2 catalysts at T = 290 °C, P_{H2} = 3.0 MPa, H_2/feed = 600 Nm^3/m^3 and methyl palmitate LHSV = 3.6–9 h^{-1}.

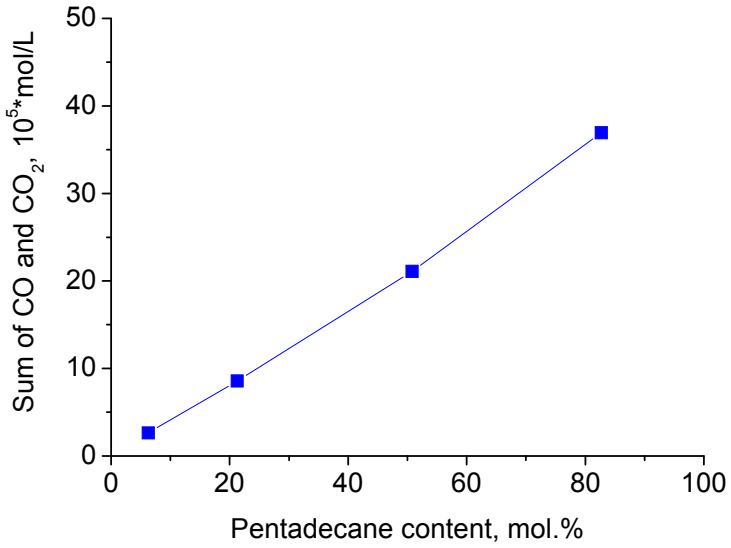

Figure S8. Dependence of the CO and CO_2 sum from pentadecane content in methyl palmitate hydrodeoxygenation over NiP_A/Al_2O_3 650 catalyst (P_{H2} = 3.0 MPa, T = 290 °C, H_2/feed = 600 Nm^3/m^3, methyl palmitate LHSV = 3.6–12 h^{-1}).