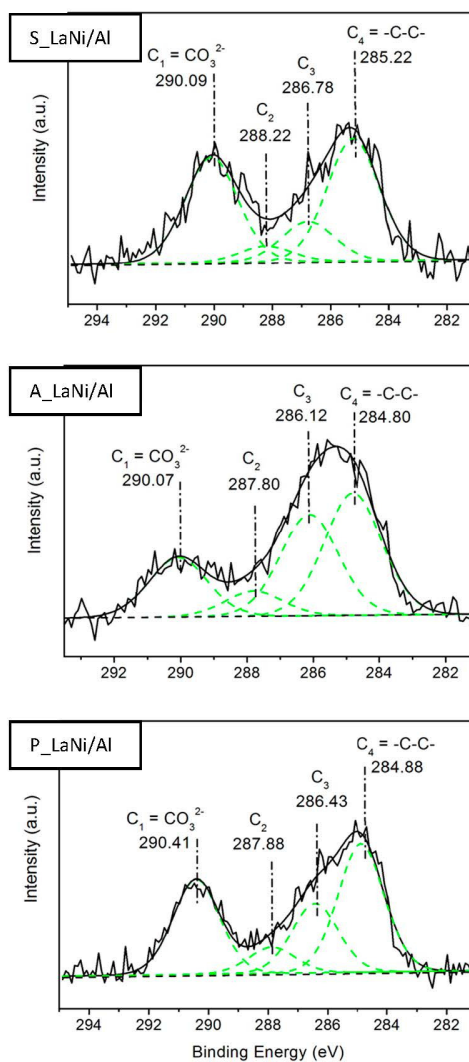


# Supplementary Materials: An Alumina-Supported Ni-La-Based Catalyst for Producing Synthetic Natural Gas

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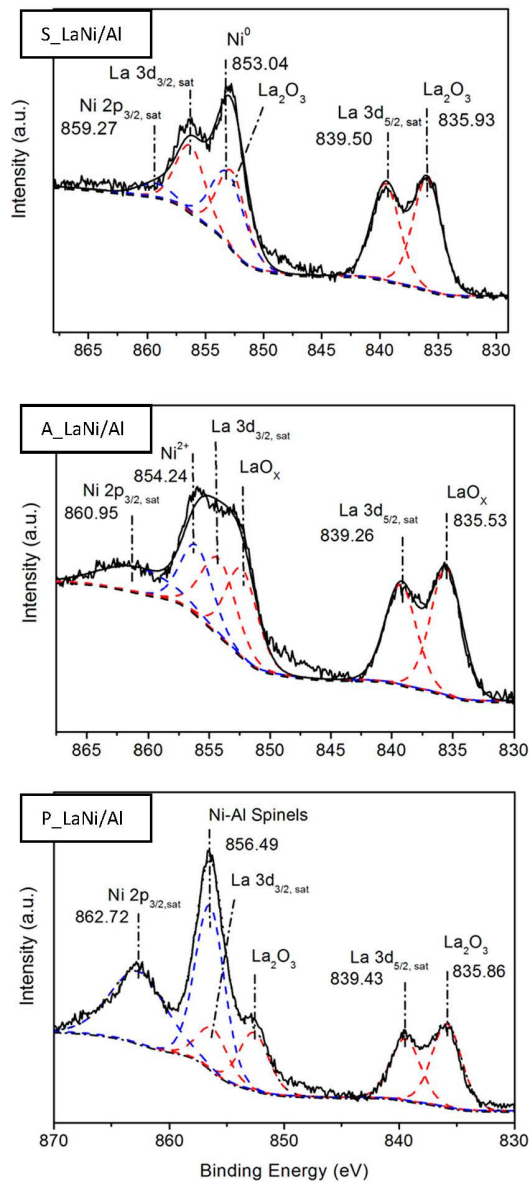
**Table S1.** Carbon (C1s) binding energies (BEs) of core electrons, surface species and relative C<sub>i</sub>/Al atomic ratio for the P\_LaNi/Al, A\_LaNi/Al, and S\_LaNi/Al.

Sample	Orbital		
	C1s		
	BE (eV)	Species	C <sub>i</sub> /Al
P_LaNi/Al	284.88	CO <sub>2</sub> <sup>3-</sup>	0.043
	286.43	-	0.023
	287.88	-	0.009
	290.41	-C-C-	0.032
A_LaNi/Al	284.80	CO <sub>2</sub> <sup>3-</sup>	0.037
	286.12	-	0.031
	287.80	-	0.008
	290.07	-C-C-	0.018
S_LaNi/Al	285.22	CO <sub>2</sub> <sup>3-</sup>	0.031
	286.78	-	0.010
	288.22	-	0.004
	290.09	-C-C-	0.027

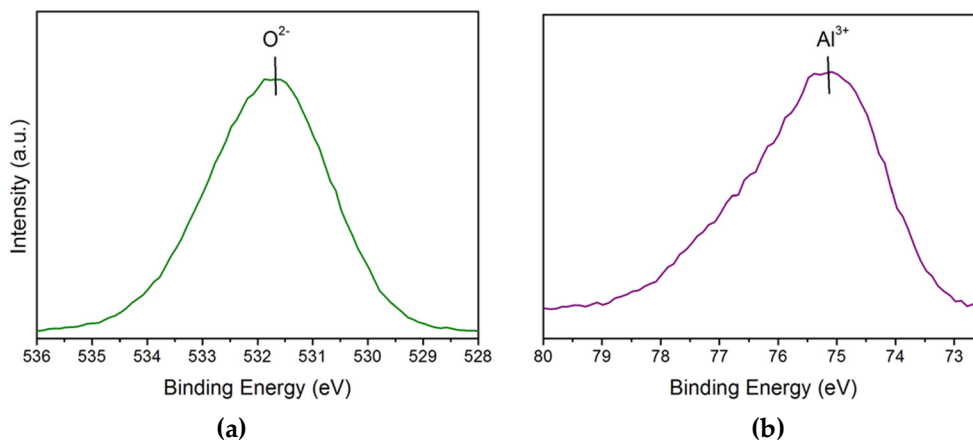


**Figure S1.** X-ray Photoelectron (XPS) spectra and curve fitting of P\_LaNi/Al, A\_LaNi/Al and S\_LaNi/Al at the C1s region.

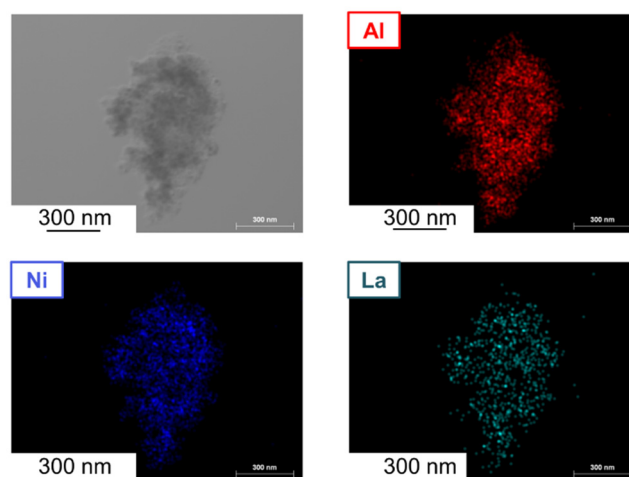
Analysis of the C1s region for P\_LaNi/Al gave a C/Al atomic ratio of 0.11 (Table S1), indicating that no substantial residual carbon remained after synthesis. In terms of the nature of C-containing species, the species labelled C<sub>1</sub> (284.88 eV) was attributed to the presence of surface –C–C– compounds, [1] while C<sub>4</sub> (290.41 eV) was ascribed to the presence of CO<sub>3</sub><sup>2-</sup> from surface La<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> [1–3]. Surface species related to the signals labelled C<sub>2</sub> and C<sub>3</sub> could not be identified.



**Figure S2.** X-ray photoelectron spectra and curve fitting of P\_LaNi/Al, A\_LaNi/Al and S\_LaNi/Al at the Ni2p and La3d region.



**Figure S3.** X-ray photoelectron spectra of the P\_LaNi/Al at the: (a) O1s; and (b) Al2p regions.



**Figure S4.** TEM images and associated elemental mapping of A\_LaNi/Al.

### References

1. Bunch, A.Y.; Wang, X.; Ozkan, U.S. Hydrodeoxygenation of benzofuran over sulfided and reduced Ni-Mo/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts: Effect of H<sub>2</sub>S. *J. Mol. Catal. A Chem.* **2007**, *270*, 264–272.
2. Park, J.-N.; McFarland, E.W. A highly dispersed Pd-Mg/SiO<sub>2</sub> catalyst active for methanation of CO<sub>2</sub>. *J. Catal.* **2009**, *266*, 92–97.
3. Verykios, X.E. Catalytic dry reforming of natural gas for the production of chemicals and hydrogen. *Hem. Ind.* **2002**, *56*, 238–255.