Electronic Supporting Information

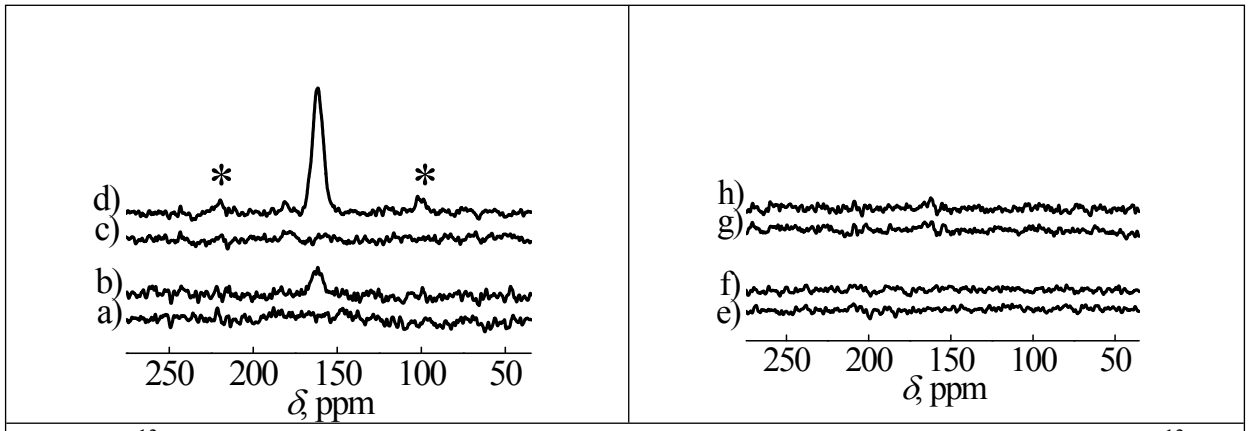


Fig S1. ^{13}C MAS spectra obtained for 1 nm Pt-NP @ γ-Al_2O_3 sample: a) before ^{13}CO adsorption, b) after ^{13}CO adsorption and for bulk γ-Al_2O_3: e) before ^{13}CO adsorption, f) after ^{13}CO adsorption. $^{1}H \rightarrow ^{13}C$ CP MAS spectra obtained for 1 nm Pt-NP @ γ-Al_2O_3 sample: c) before ^{13}CO adsorption, d) after ^{13}CO adsorption and for bulk γ-Al_2O_3: g) before ^{13}CO adsorption, h) after ^{13}CO adsorption. Note: Spinning sidebands are indicated by asterisks.

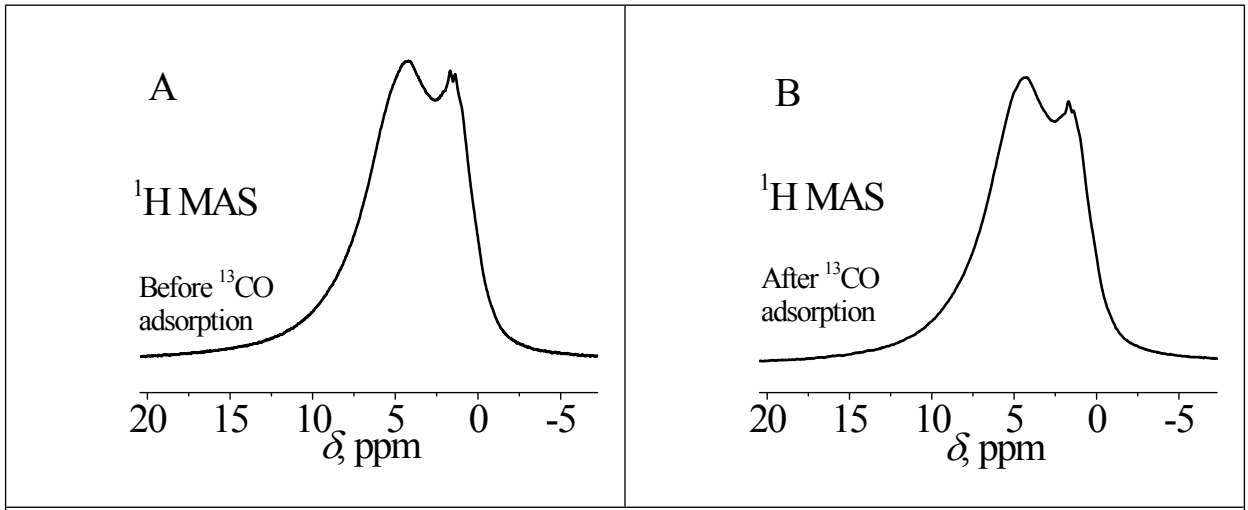


Fig S2. ^{1}H MAS spectra obtained for the 2 nm Pt-NP @ γ-Al_2O_3 sample A – before and B – after ^{13}CO adsorption.

Table S1. Multiple Voigt curve fitting parameters of the fit performed for ^{1}H MAS spectrum for sample 2 nm Pt-NP @ γ-Al_2O_3 after ^{13}CO adsorption showed in Fig 3.

Model	Voigt		
Equation	y = nlf_voigt(x,y0,xc,A,wG,wL);		
Reduced Chi-Sqr	2.64E+11		
Adj. R-Square	0.99997		
		Value	Standard Error
	y0	-929267.966	112155.8913
	xc	5.96292	0.07828
	A	3.18E+08	1.89E+07
	wG	5.42979	0.06158
	wL	1.59018	0.06466
	FWHM	6.3301	0.06997
	y0	-929267.966	112155.8913
	xc	4.4	0
	A	1.22E+09	2.50E+07
	wG	2.10225	0.02338
	wL	2.81721	0.05024
	FWHM	3.98368	0.0213
	y0	-929267.966	112155.8913
	xc	1.7	0
	A	3.12E+06	235896.7997
	wG	0.14849	0.01731
	wL	0.10056	0.02514
	FWHM	0.20945	0.00435
	y0	-929267.966	112155.8913
	xc	1.4	0
	A	4.05E+08	4.44E+06
	wG	2.10648	0.01486
	wL	0.86276	0.025
	FWHM	2.60564	0.00424
	y0	-929267.966	112155.8913
	xc	1.13943	0.00487
	A	6.24E+07	2.46E+06
	wG	1.56E-08	94.9527
	wL	1.4074	0.02738
	FWHM	1.40741	0.02738

Table S2. List of discussed samples, which were investigated by DNP. $W_1 = \frac{m_1}{m_1 + m_2} \cdot 100\%$ – weight % of bulk γ-Al_2O_3 in the sample, $W_2 = \frac{m_1 + m_2}{m_1 + m_2 + m_3} \cdot 100\%$ – weight % of solid in the sample, where m_1 – weight of bulk γ-Al_2O_3, m_2 – weight of supported Pt-NPs, m_3 – weight of DNP matrix. ε (^{1}H) – proton signal enhancement, ε (^{13}C CP) – ^{1}H→^{13}C CP signal enhancement, ε (^{13}C) – ^{13}C signal enhancement.

Sample	^{13}CO adsorption	W_1	W_2	ε (^{1}H)	ε (^{13}C CP)		ε (^{13}C)	
					TCE (78 ppm)	Carbonate (167 ppm)	TCE (78 ppm)	Carbonate (167 ppm)
2 nm Pt-NP @ γ-Al_2O_3	No	0	48	108 ± 1	--	not observed	--	--
	Yes	0	45	107 ± 1	104 ± 1	98 ± 5	12 ± 1	20 ± 4
1 nm Pt-NP @ γ-Al_2O_3	Yes	0	50	108 ± 1	106 ± 1	89 ± 1	11 ± 1	15 ± 3
2 nm Pt-NP @ TiO_2	Yes	0	37	169 ± 1	167 ± 4	not observed	--	--
2 nm Pt-NP @ TiO_2 + γ-Al_2O_3	No	63	41	164 ± 1	157 ± 2	--*	--	--
	Yes	62	48	104 ± 1	101 ± 2	192 ± 64	--	--
2 nm Pt-NP @ SiO_2	Yes	0	30	106 ± 1	--	not observed	--	--
2 nm Pt-NP @ SiO_2 + γ-Al_2O_3	Yes	66	41	130 ± 1	132 ± 3	114 ± 14	--	--
2 nm Pt-NP @ fumed silica	Yes	0	39	120 ± 1	--	not observed	11 ± 1	not observed
2 nm Pt-NP @ fumed silica + γ-Al_2O_3	Yes	71	40	140 ± 1	127 ± 2	127 ± 12	--	--
γ-Al_2O_3	No	100	51	159 ± 2	154 ± 5	--*	--	--
	Yes	100	51	134 ± 1	128 ± 3	--*	--	--
γ-Al_2O_3	$^{13}CO_2$**	100	44	150 ± 1	149 ± 3	155 ± 7	--	--

* – the enhancement factor was impossible to estimate due to too low signal to noise level in spectra without μw irradiation.

** – $^{13}CO_2$ gas was used instead of ^{13}CO gas.

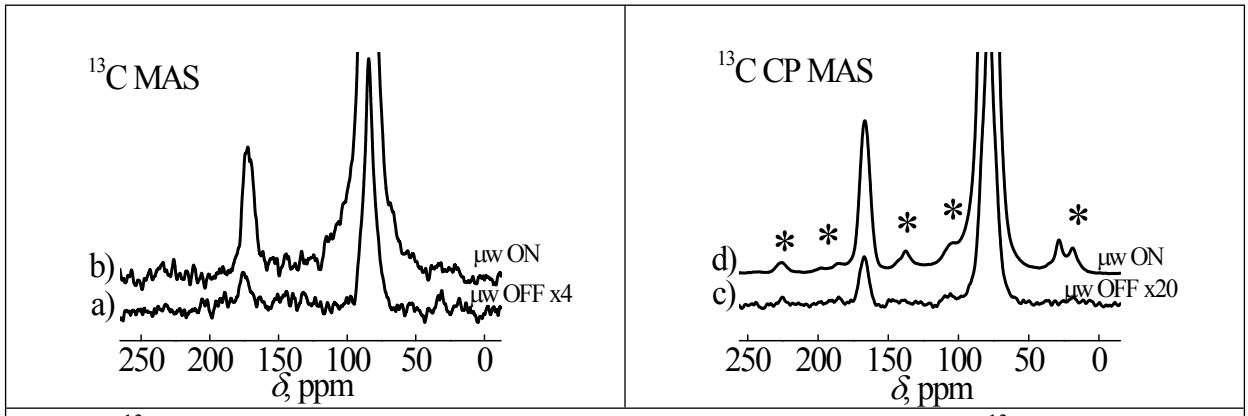


Fig S3. ^{13}C MAS spectra obtained for 1 nm Pt-NP @ γ-Al_2O_3 sample after ^{13}CO adsorption a) without and b) with μw irradiation. $^{1}H \rightarrow ^{13}C$ CP MAS spectra obtained for 1 nm Pt-NP @ γ-Al_2O_3 sample after ^{13}CO adsorption c) without and d) with μw irradiation. Note: Samples for measurements were prepared by impregnation with 15 mM TEKPol in 1,1,2,2-tetrachloroethane (TCE). Spectra a) and c) are enlarged by factors of 4 and 20, respectively, to make signals visible. Spinning sidebands are indicated by asterisks. Signals at around 30 ppm arise due to impurities.

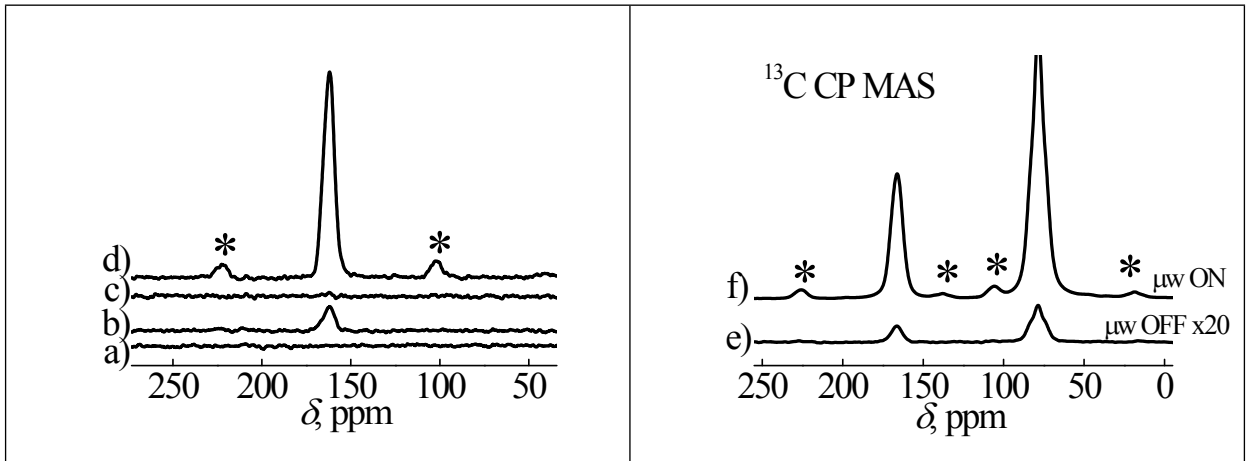


Fig S4. ^{13}C MAS spectra obtained for γ-Al_2O_3 sample: a) before $^{13}CO_2$ adsorption, b) after $^{13}CO_2$ adsorption. $^{1}H \rightarrow ^{13}C$ CP MAS spectra obtained for γ-Al_2O_3 sample: c) before $^{13}CO_2$ adsorption, d) after $^{13}CO_2$ adsorption. $^{1}H \rightarrow ^{13}C$ CP MAS spectra obtained for the γ-Al_2O_3 sample after $^{13}CO_2$ adsorption: e) without and f) with μw irradiation. Note: Samples for measurements of spectra e) and f) were prepared by impregnation with 15 mM TEKPol in 1,1,2,2-tetrachloroethane (TCE). Spectrum e) is enlarged by a factor of 20 to make signals visible. Spinning sidebands are indicated by asterisks.

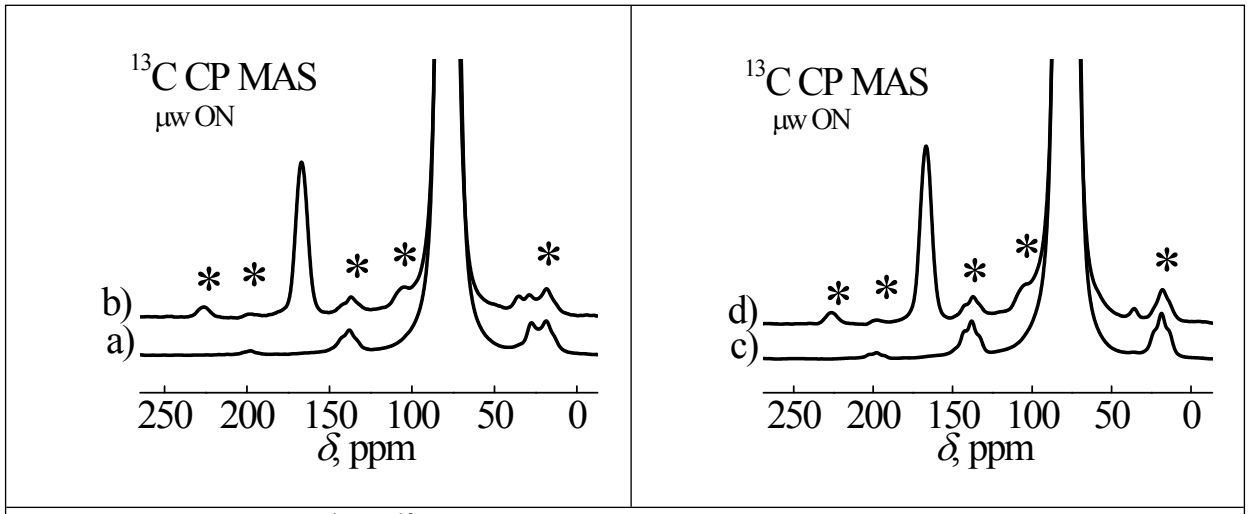
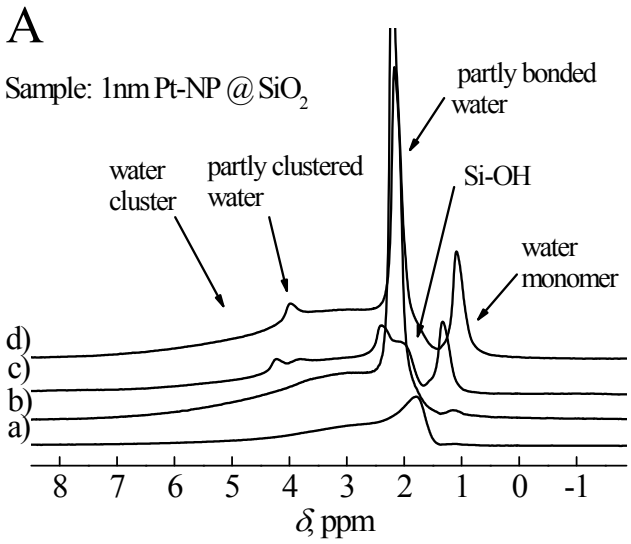
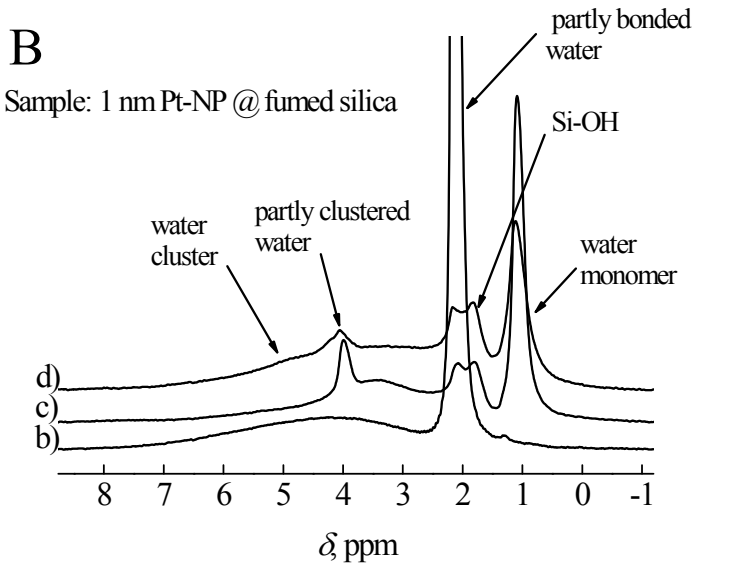


Fig S5. DNP enhanced $^{1}H \rightarrow ^{13}C$ CP MAS spectra obtained for a) 2nm Pt-NP @ SiO_2 sample after ^{13}CO adsorption, b) 2nm Pt-NP @ SiO_2 + γ-Al_2O_3 sample after ^{13}CO adsorption, c) 2nm Pt-NP @ fumed silica sample after ^{13}CO adsorption, d) 2nm Pt-NP @ fumed silica + γ-Al_2O_3 sample after ^{13}CO adsorption. Note: Samples for measurements were prepared by impregnation with 15 mM TEKPol in 1,1,2,2-tetrachloroethane (TCE). Spinning sidebands are indicated by asterisks. Signals at around 30 ppm arise due to impurities.





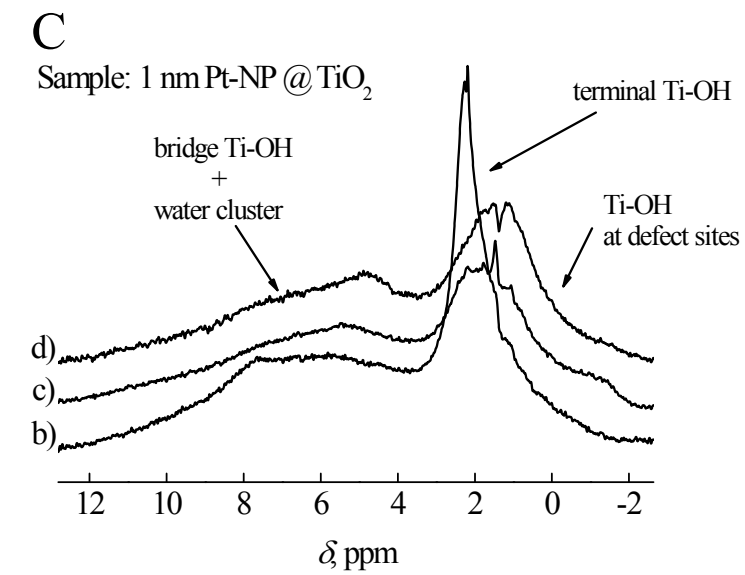


Fig S6. ^{1}H MAS spectra obtained for: A) 1 nm Pt-NP @ SiO_2, B) 1 nm Pt-NP @ fumed silica, C) 1 nm Pt-NP @ TiO_2 samples; a) vacuum dried for 12 h at room temperature, b) no gas or vacuum treatment, c) 3 times purged with H_2 gas at 3 bar, d) after ^{13}CO adsorption. Spectral assignment is indicated in the figures.