## Supplementary information for

## Commercial spirits for surfactant-free syntheses of electro-active platinum nanoparticles

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**Figure S1**. **Size distribution**. Size distribution obtained from TEM micrographs analysis for Pt NPs obtained using alkaline (a) Control (37.5 v.% ethanol in water), (b) Gin, (c) Vodka and (d) Rum.



**Figure S2**. **FTIR spectra**. (a) FTIR spectra of a blank (37.5 v.% ethanol in water) without Pt salt or Pt NPs (grey) and IR spectra of colloidal dispersions of Pt NPs obtained using alkaline (blue) Control (37.5 v.% ethanol in water), (red) Gin, (orange) Vodka and (green) Rum. (b) FTIR spectra of the colloidal dispersions of Pt NPs subtracted by a background without NPs (a 'blank'). The range chosen is the range were possibly CO bonded stretches could be observed on NPs by analogy with other unprotected precious metal NPs obtained in other solvents.



**Figure S3. Head-space GC-MS chromatograms before NP synthesis**. Head-space GC-MS chromatograms of the different alkaline solvents used: (a) Control (37.5 v.% ethanol in water), (b) Gin, (c) Vodka and (d) Rum. The dotted line corresponds to the solvent without base.



**Figure S4**. **Head-space GC-MS chromatograms after NP synthesis**. Head-space GC-MS chromatograms of the solutions after synthesis of Pt NPs in different alkaline solvents: (a) Control (37.5 v.% ethanol in water, (b) Gin, (c) Vodka and (d) Rum. The dotted line corresponds to the same conditions (same alkaline solvent) before heat-treatment.

Retention time / min	m/z	tentative attribution
1.5-1.8	28-44	CO/N <sub>2</sub> /CO <sub>2</sub>
1.7-2.0	18	H <sub>2</sub> O
1.9	44	Acetaldehyde
2.2-2.4	46	Ethanol
3.4	88	Ethyl acetate
4.4	118 (highest mass peak: 103)	1,1-diethoxy-ethane

Table S1. Summary of the peak observed by head-space GC-MS and possible attribution.



**Figure S5**. **Time evolution of Pt NP colloidal dispersions**. Pictures of the colloidal solutions assynthesized after 1 day and after 5 weeks (as indicated) for Pt NPs prepared with 2.5 mM H<sub>2</sub>PtCl<sub>6</sub> and 50 mM NaOH and heated up for 1 hour under reflux conditions using a microwave oven and with alkaline solvent (a) Control (37.5 v.% ethanol in water), (b) Gin, (c) Vodka and (d) Rum. (e) is a mixture of 50 mM NaOH in 75 % water and 25 % ethanol (without using any H<sub>2</sub>PtCl<sub>6</sub>).



**Figure S6**. **Electrochemical characterization**. Maximum geometric current density and related potential recorded on cyclic voltammograms as a function of number of cycles for the alkaline (1 M KOH) oxidation of methanol (1 M) by Pt NPs synthesized using alkaline vodka as solvent.