Supplementary Information

4-mercaptophenyldiphenylphosphine as linker to immobilize Pd onto the surface of magnetite nanoparticles. Excellent catalytic efficiency of the system after partial linker removal

Anderson Guarnizo,[a] Inmaculada Angurell,*[a] Marta D. Rossell,[b] Jordi Llorca,[c] Guillermo Muller,[a] Miquel Seco,[a] and Oriol Rossell*[a]

[a] A. Guarnizo, Dr. I. Angurell, Dr. M. Seco, Prof. G. Muller, Prof. O. Rossell
Departament de Química Inorgànica, Universitat de Barcelona, Martí i Franquès 1-11, 08028 Barcelona (Spain)
e-mail: inmaculada.angurell@qi.ub.es; oriol.rossell@qi.ub.es

[b] Dr. M. D. Rossell
Electron Microscopy Center
Empa, Swiss Federal Laboratories for Materials Science and Technology
Überlandstrasse 129, 8600 Dübendorf (Switzerland)

[c] Prof. J. Llorca
Institut de Tècniques Energètiques i Centre de Recerca en Nanoenginyeria, Universitat Politècnica de Catalunya, Diagonal 647, 08028 Barcelona (Spain)

Figures:

Tables:

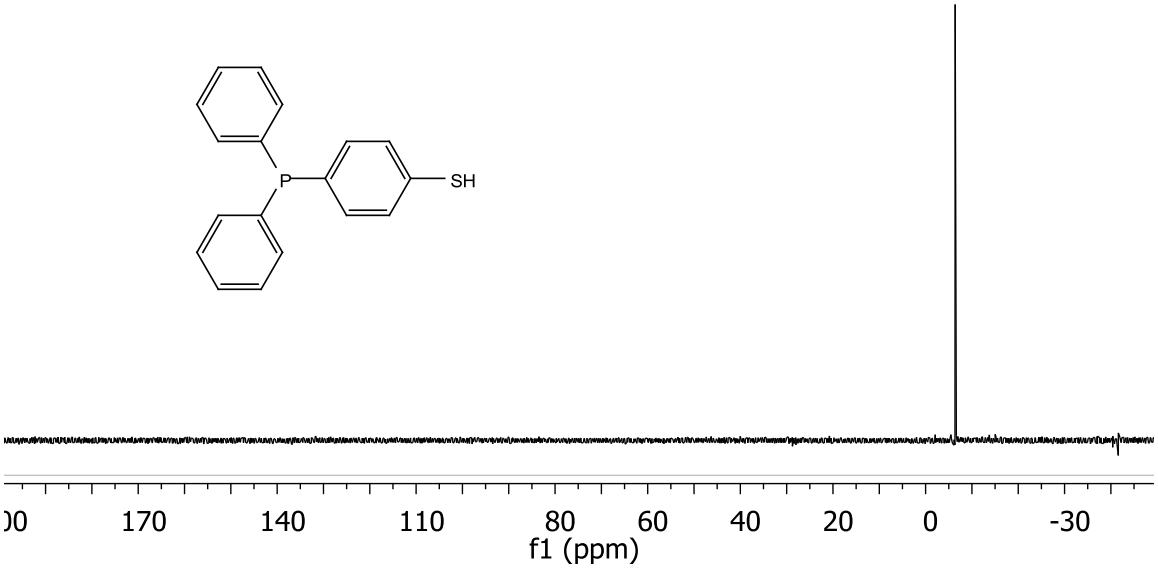

Fig. S1 $^{31}P\{^{1}H\}$NMR of **Sdp** in $CDCl_3$.

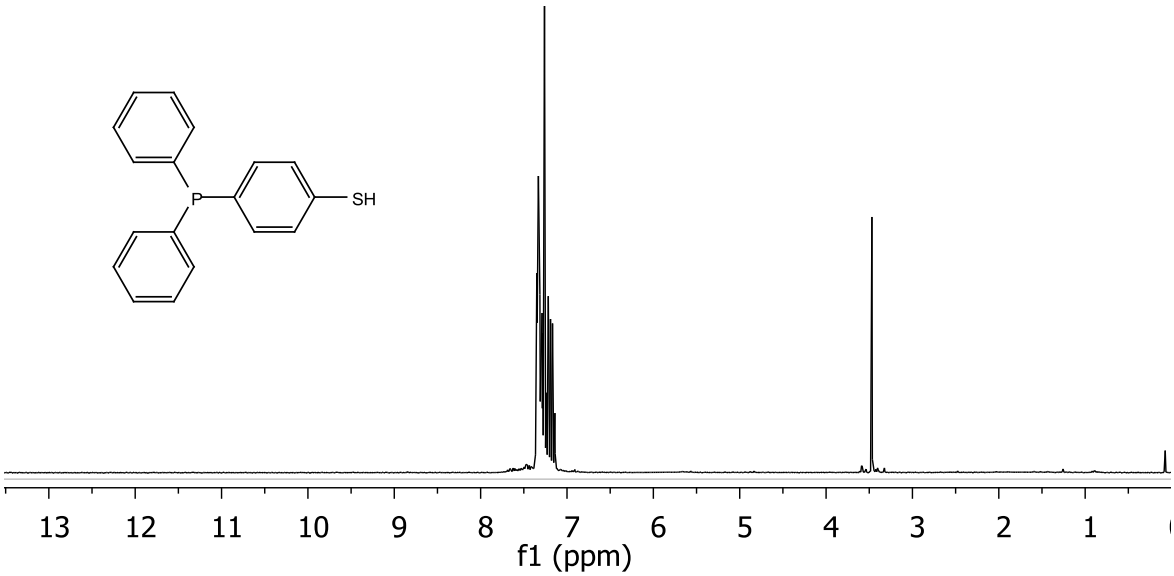

Fig. S2 ^{1}H NMR of **Sdp** in $CDCl_3$.

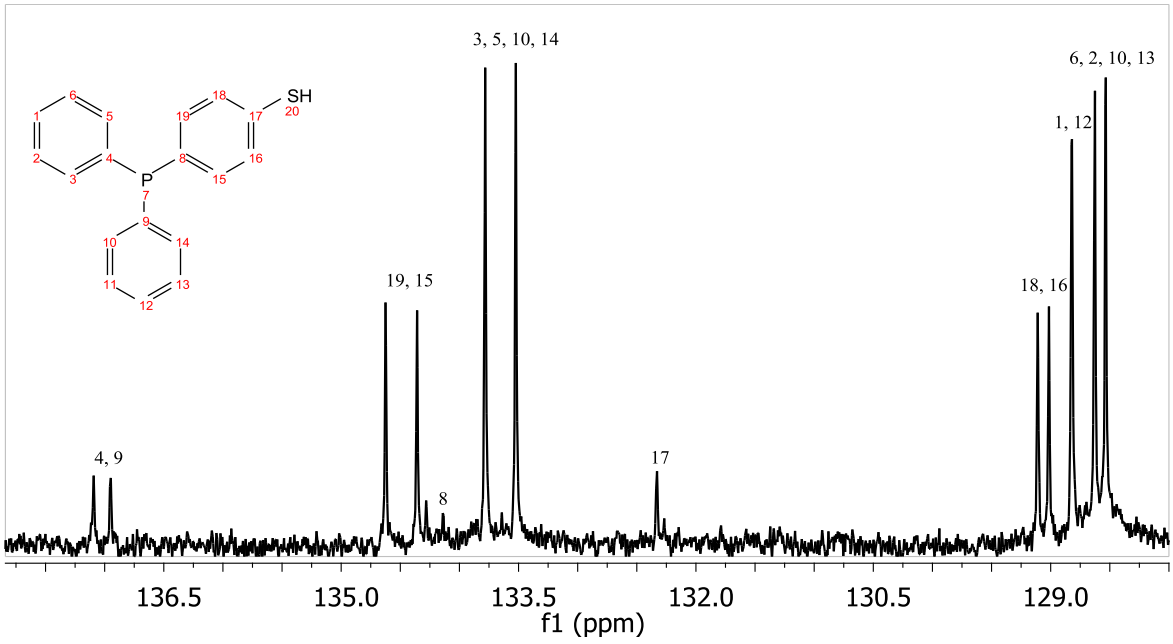

Fig. S3 $^{13}C\{^{1}H\}$NMR of **Sdp** in $CDCl_3$.

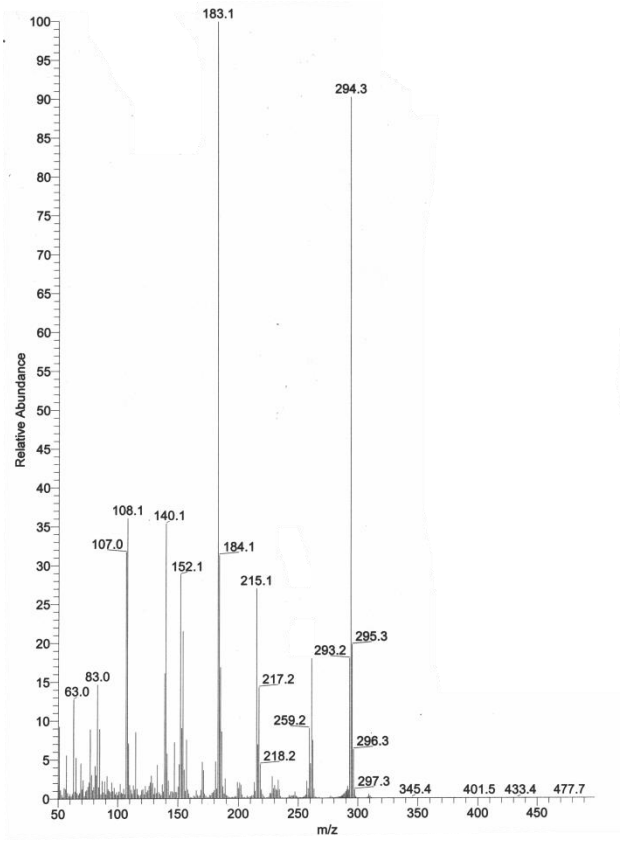

Fig. S4 ESI-MS(+) of **Sdp**.

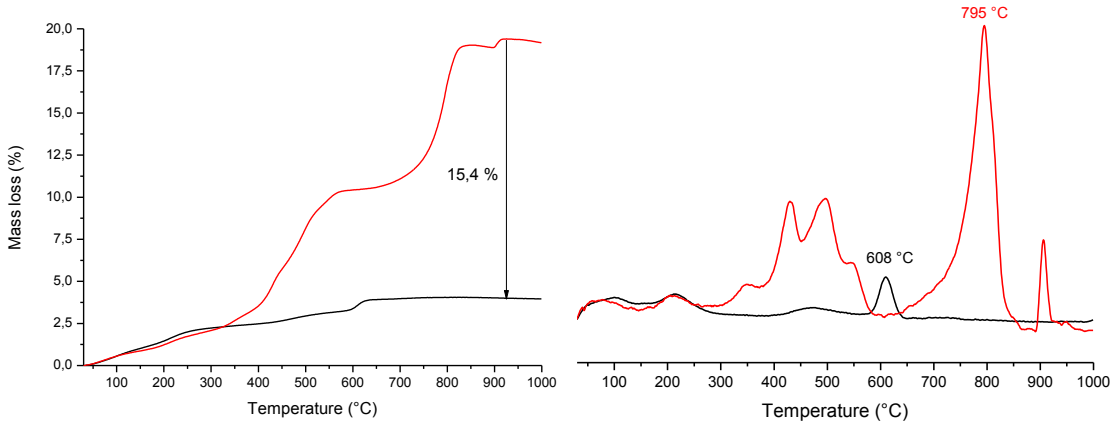

Fig. S5 Left: TGA of **Fe_3O_4Sdp** and right, its DTGA. Black: Fe_3O_4, Red: **Fe_3O_4Sdp**.

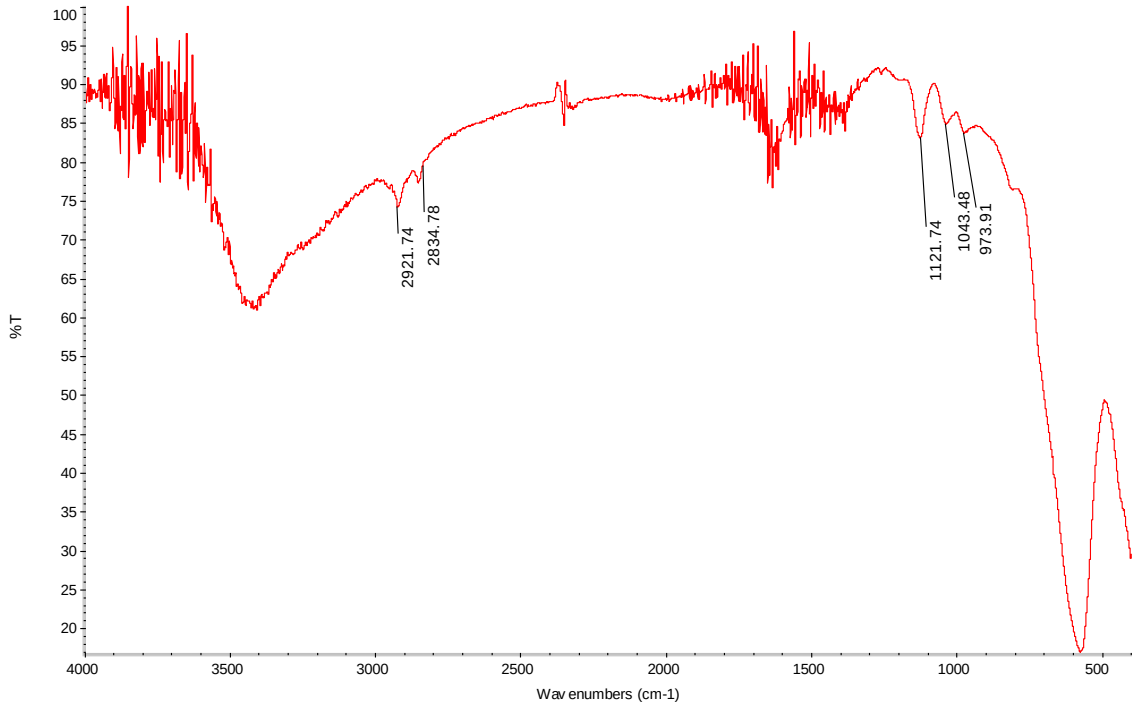

Fig. S6 FT-IR spectrum of **Fe_3O_4Sdp**.

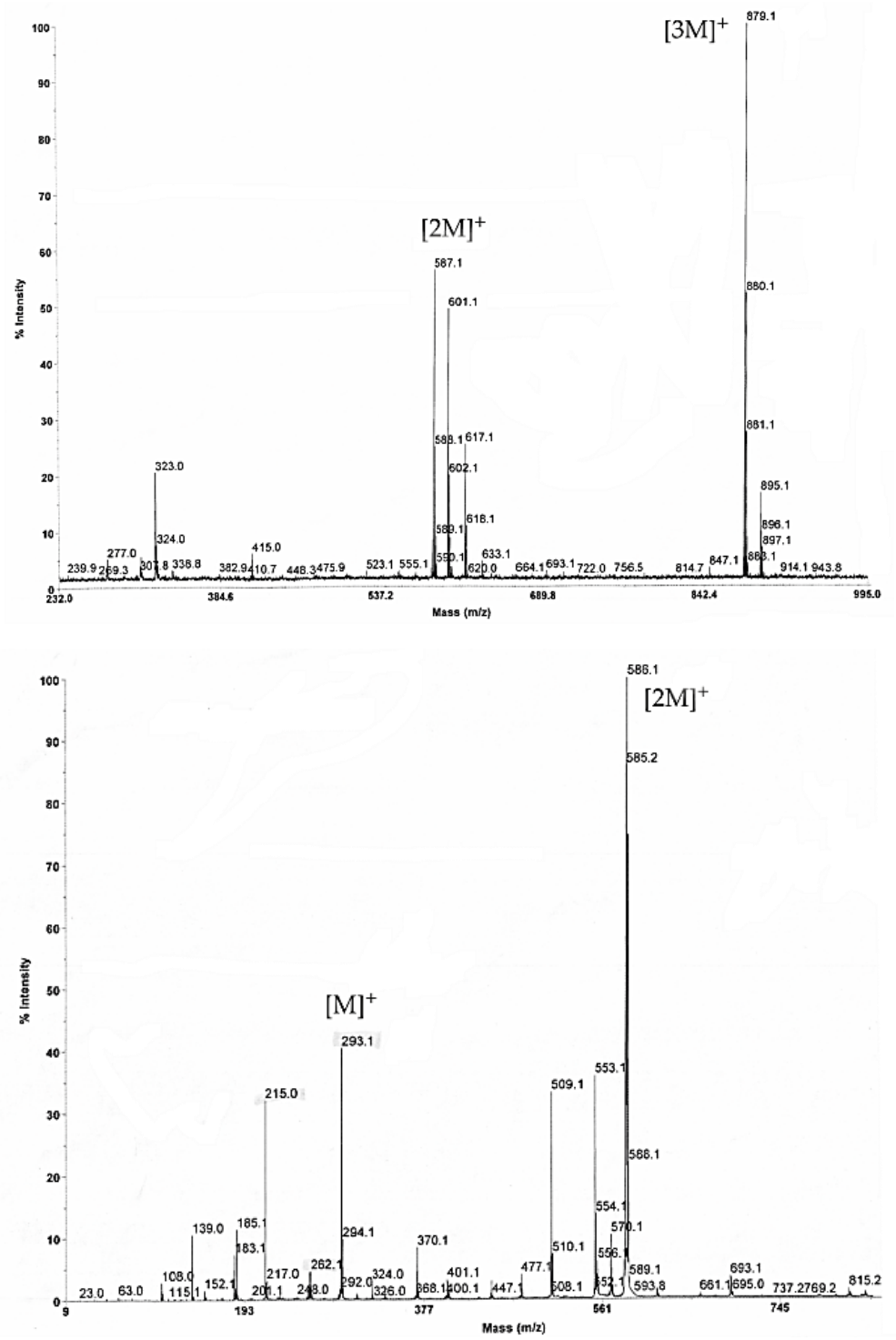

Fig. S7 MALDI-TOF/TOF of **Fe_3O_4Sdp**.

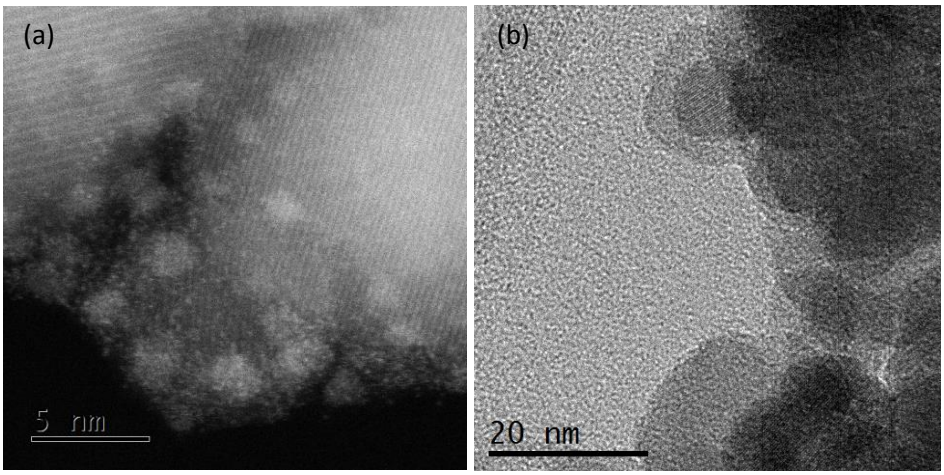

Fig. S8 (a) HAADF-STEM of **Fe_3O_4Sdp@Pd** NPs showing small Pd NPs on the magnetite surface. (b) TEM of **Fe_3O_4Sdp@Pd** NPs showing the organic layer surrounding the magnetite.

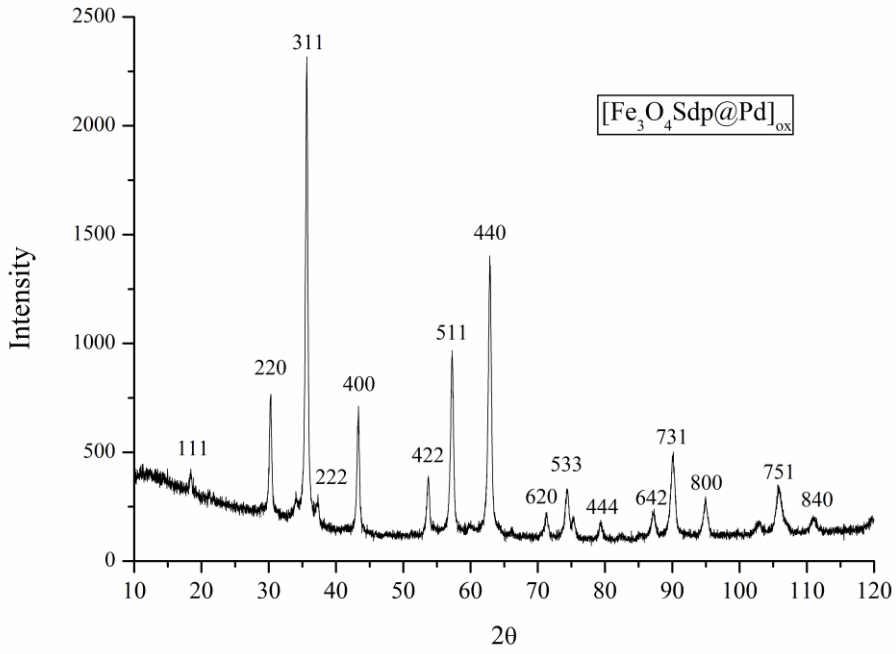

Fig. S9 XRD of **$[Fe_3O_4$Sdp@Pd$]_{ox}$**.

Table S1 Reusability of **[Fe_3O_4Sdp@Pd]$_{ox}$** catalyst in the Suzuki-Miyaura cross-coupling reaction of 4-bromonitrobenzene with phenylboronic acid.

Cycle	**1**	**2**	**3**	**4**
Yield(%)	100	100	92	88

Reaction conditions: 0.1 mmol BB, 0.12 mmol phenylboronic acid, 5×10^{-4} mmol Pd in catalyst, 4h, 0.3 mmol KOH, EtOH:H_2O, 65°C

Table S2 Reusability of **[Fe_3O_4Sdp@Pd]$_{ox}$** catalyst in the hydrogenation of 4-nitrophenol.

Cycle	**1**	**2**	**3**	**4**	**5**
Yield(%)	100	100	100	100	90

Reaction conditions: 0.22 µmol 4-nitrophenol, 3.6×10^{-3} µmol Pd in catalyst, 15 min, H_2O, r.t.

Table S3 Reusability of **[Fe_3O_4Sdp@Pd]$_{ox}$** catalyst in the hydrogenation of styrene.

Cycle	**1**	**2**	**3**	**4**	**5**	**6**
Yield(%)	100	100	100	100	83	69

Reaction conditions: 3.0 mmol styrene, 1 µmol Pd in catalyst, 1h, ethanol, 3 bar H_2, r.t.