Supporting Information for

Exceptionally Active Assembled Dinuclear Ruthenium(II)-NNN Complex Catalysts for Transfer Hydrogenation of Ketones

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1. X-Ray crystallographic data for complex 3d

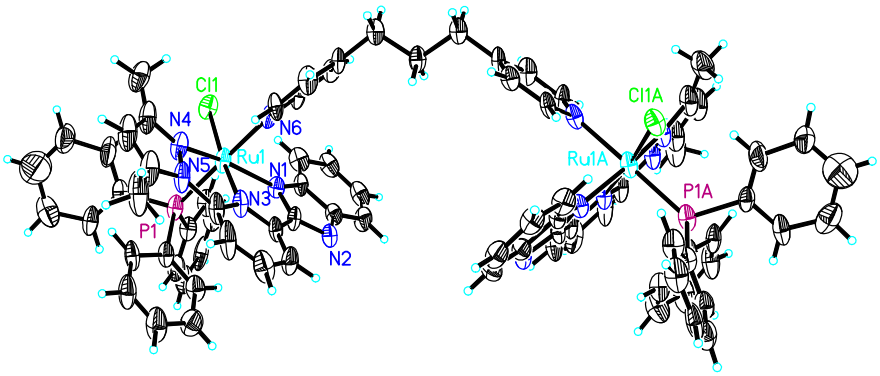

Figure S1. Molecular structure of complex **3d**.

Table S1. Crystal data and structure refinement for complex **3d**.

Identification code	mo_dm14386_0m	
Empirical formula	C83H72 Cl2 N12 P2 Ru2	
Formula weight	1572.50	
Temperature	140(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	C 2/c	
Unit cell dimensions	a = 39.654(5) Å	α = 90°
	b = 12.7311(17) Å	β = 93.851(2)°
	c = 38.082(5) Å	γ = 90°
Volume	19182(4) $Å^3$	
Z	8	
Density (calculated)	1.089 Mg/m^3	
Absorption coefficient	0.446 mm^{-1}	
F(000)	6448	
Crystal size	0.250 × 0.200 × 0.060 mm^3	
Theta range for data collection	1.029 to 26.000°.	
Index ranges	-42<=h<=48, -15<=k<=15, -46<=l<=46	
Reflections collected	68464	

Independent reflections	18853 [R(int) = 0.0822]
Completeness to theta = 25.242°	99.9 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	0.7456 and 0.5427
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	18853 / 269 / 917
Goodness-of-fit on F^2	1.139
Final R indices [I>2sigma(I)]	R1 = 0.0894, wR2 = 0.2411
R indices (all data)	R1 = 0.1479, wR2 = 0.2594
Extinction coefficient	n/a
Largest diff. peak and hole	1.378 and -0.705 e.Å^{-3}

2. Copies of NMR spectra

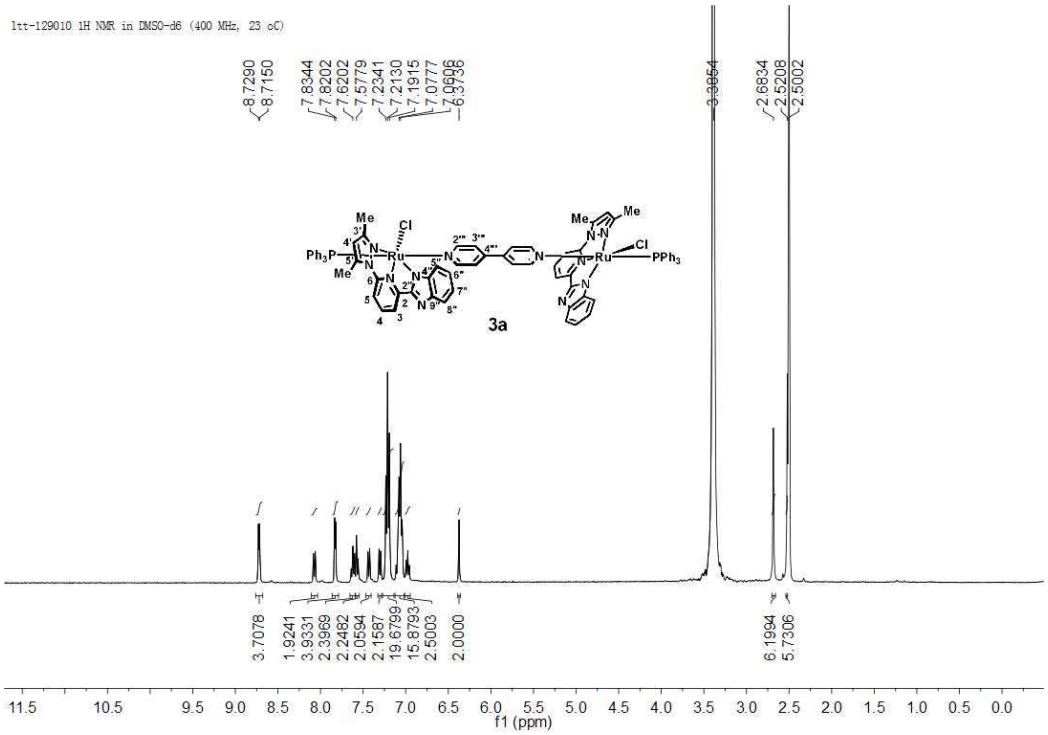

Figure S2. ^{1}H NMR spectrum of complex **3a** (DMSO-d_6, 400 MHz, 23 ^{o}C).

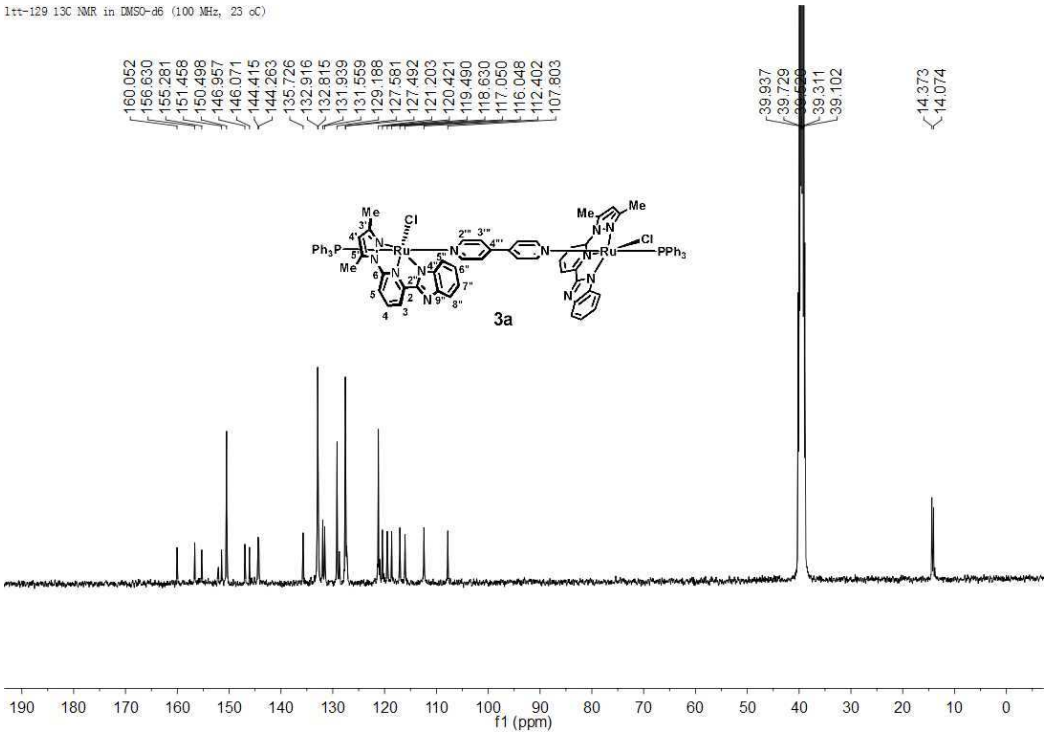

Figure S3. ^{13}C NMR spectrum of complex **3a** (DMSO-d_6, 100 MHz, 23 ^{o}C).

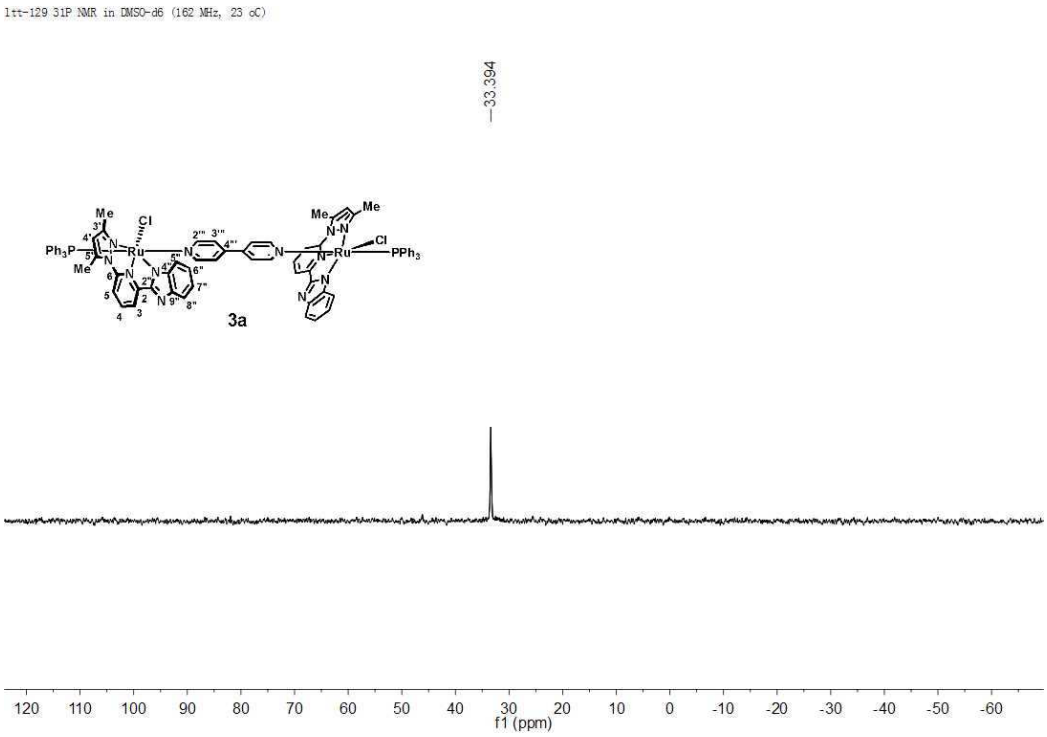

Figure S4. ^{31}P NMR spectrum of complex **3a** (DMSO-d_6, 162 MHz, 23 ^{o}C).

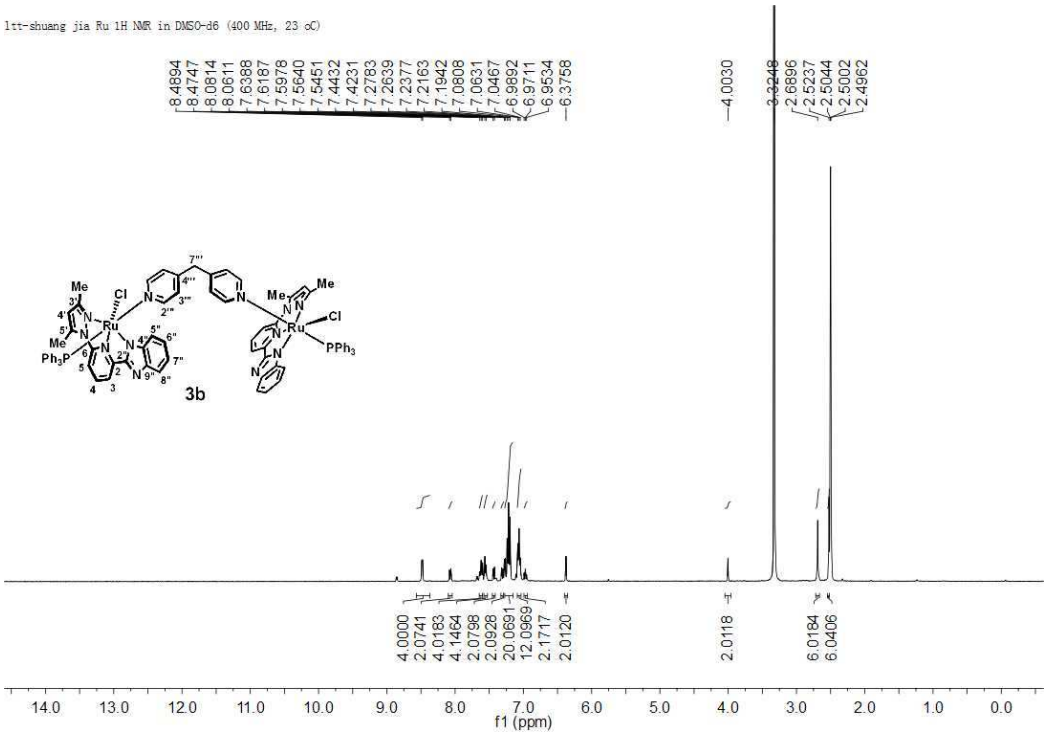

Figure S5. ^{1}H NMR spectrum of complex **3b** (DMSO-d_6, 400 MHz, 23 ^{o}C).

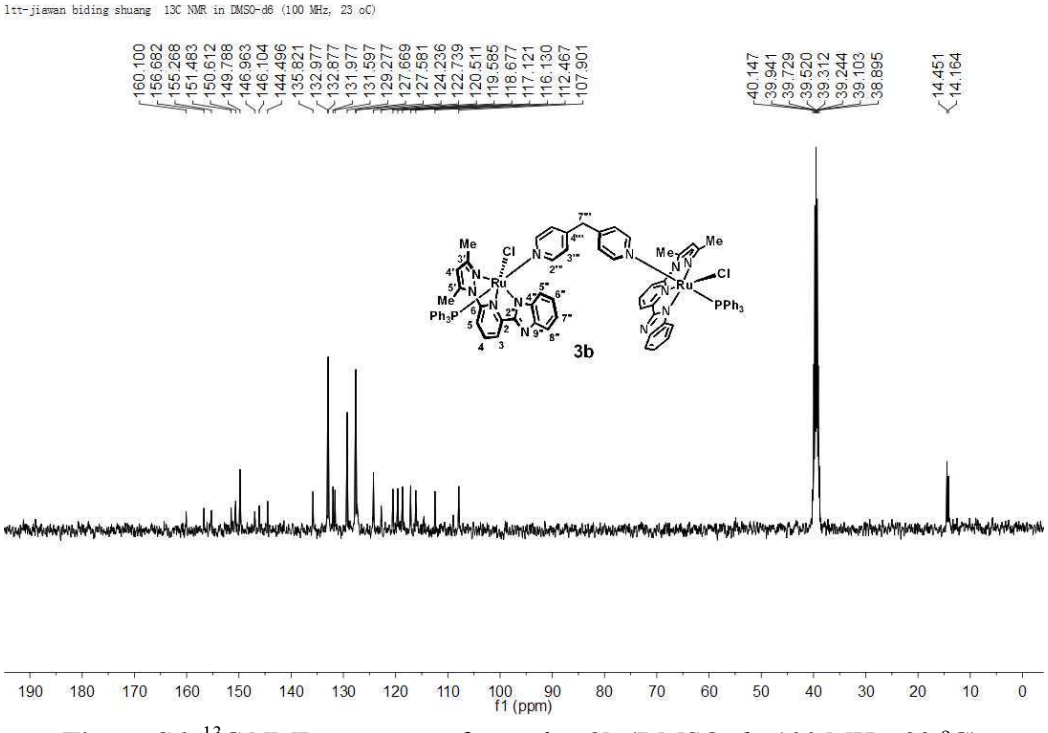

Figure S6. ^{13}C NMR spectrum of complex **3b** (DMSO-d_6, 100 MHz, 23 ^{o}C).

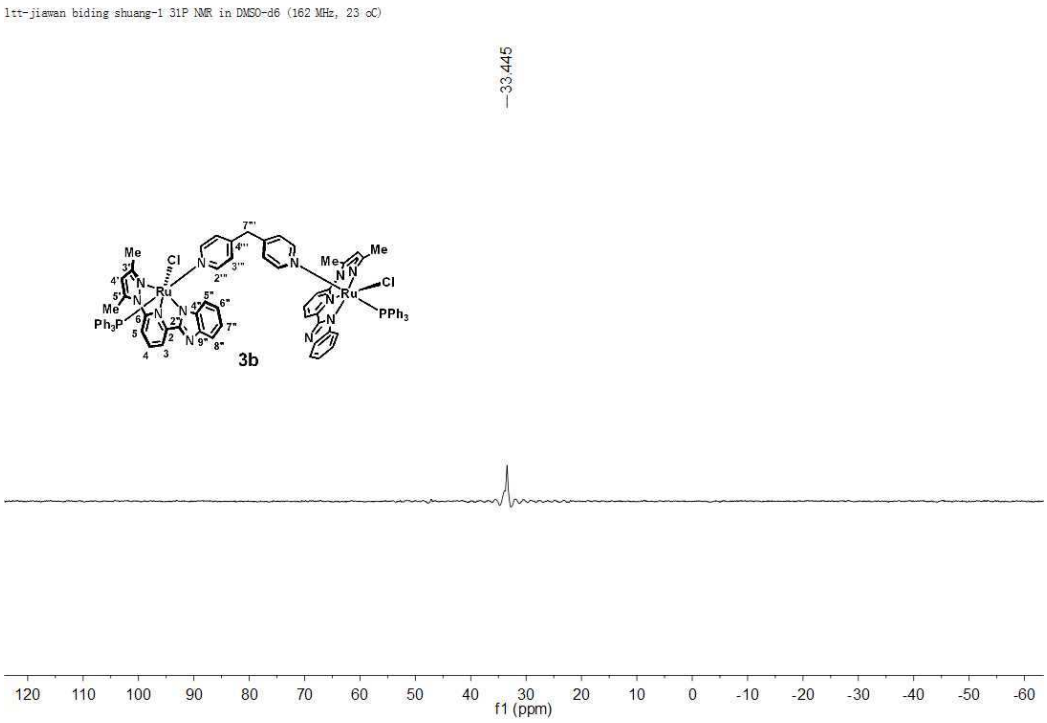

Figure S7. ^{31}P NMR spectrum of complex **3b** (DMSO-d_6, 162 MHz, 23 ^{o}C).

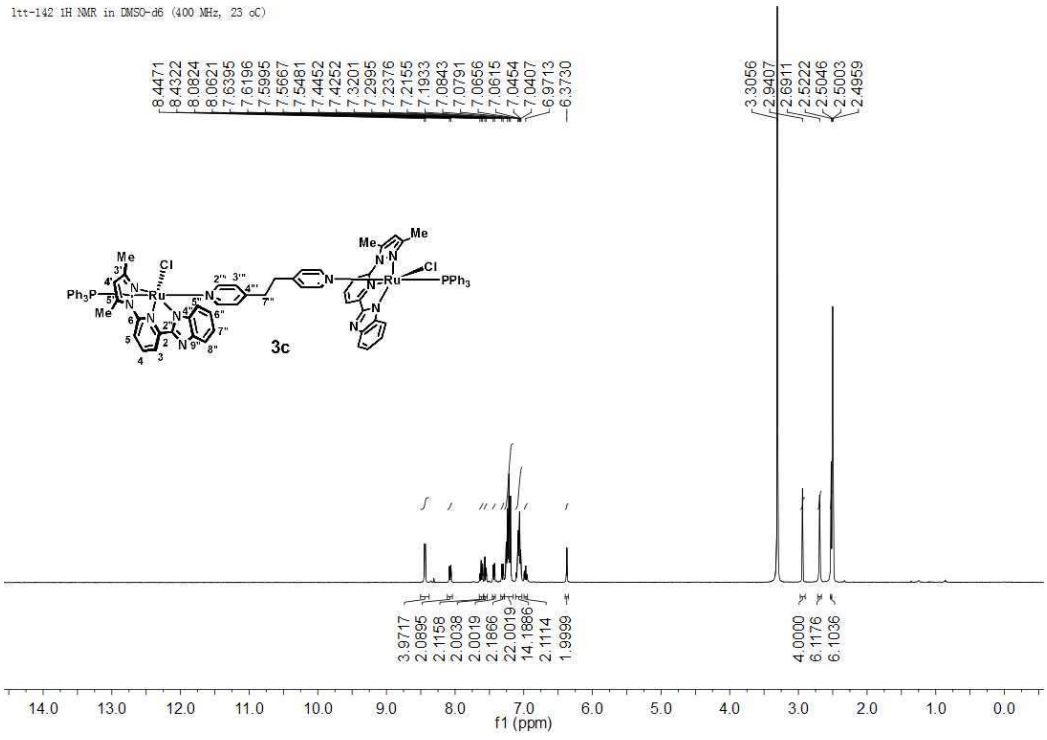

Figure S8. ^{1}H NMR spectrum of complex **3c** (DMSO-d_6, 400 MHz, 23 ^{o}C).

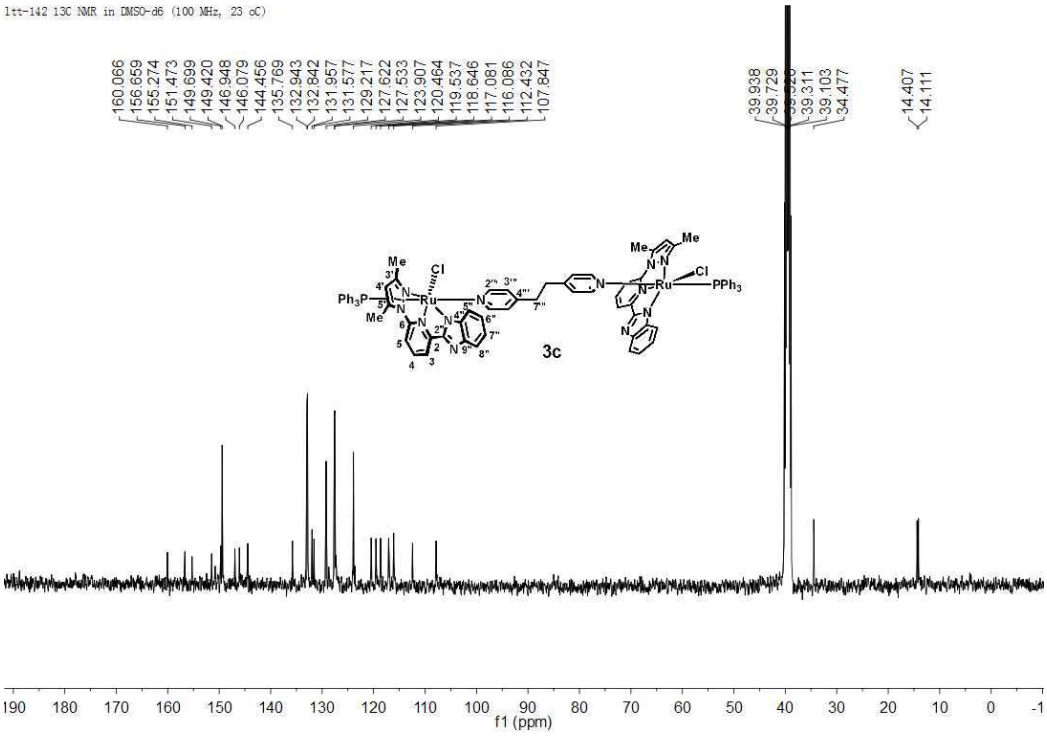

Figure S9. ^{13}C NMR spectrum of complex **3c** (DMSO-d_6, 100 MHz, 23 ^{o}C).

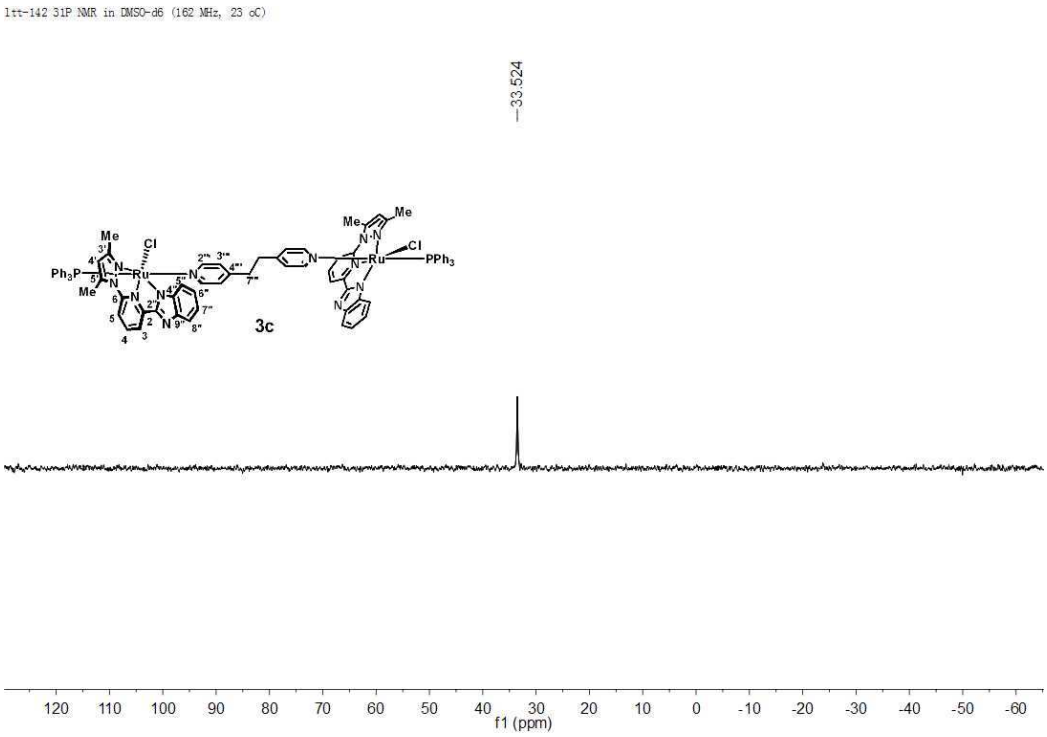

Figure S10. ^{31}P NMR spectrum of complex **3c** (DMSO-d_6, 162 MHz, 23 ^{o}C).

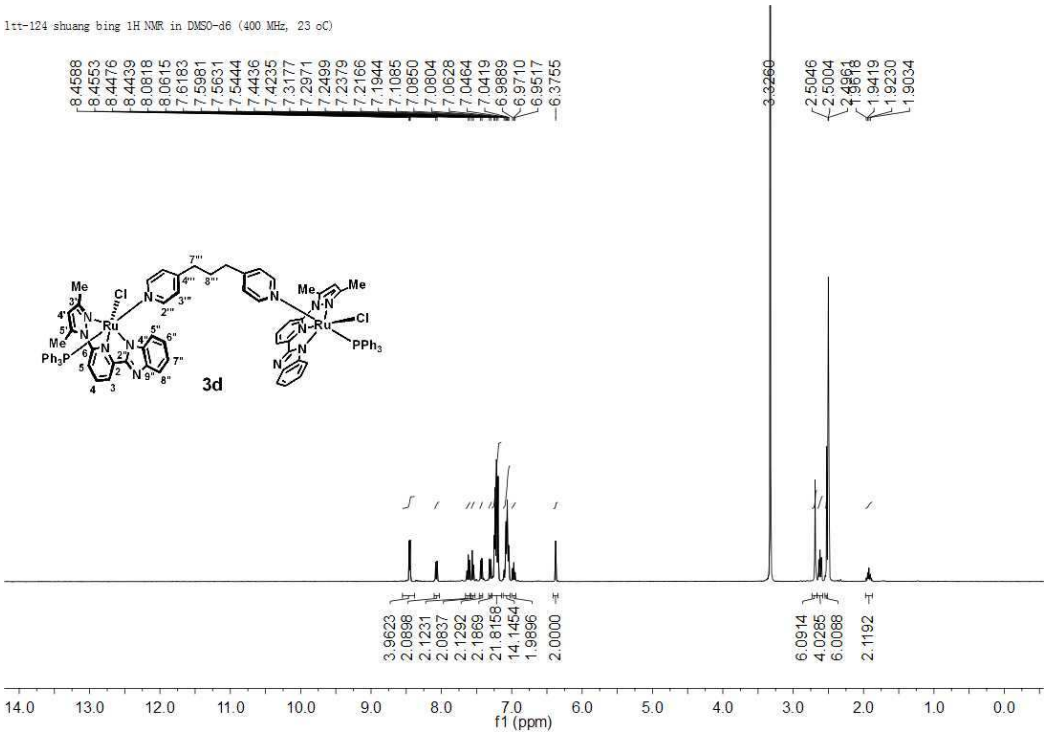

Figure S11. ^{1}H NMR spectrum of complex **3d** (DMSO-d_6, 400 MHz, 23 ^{o}C).

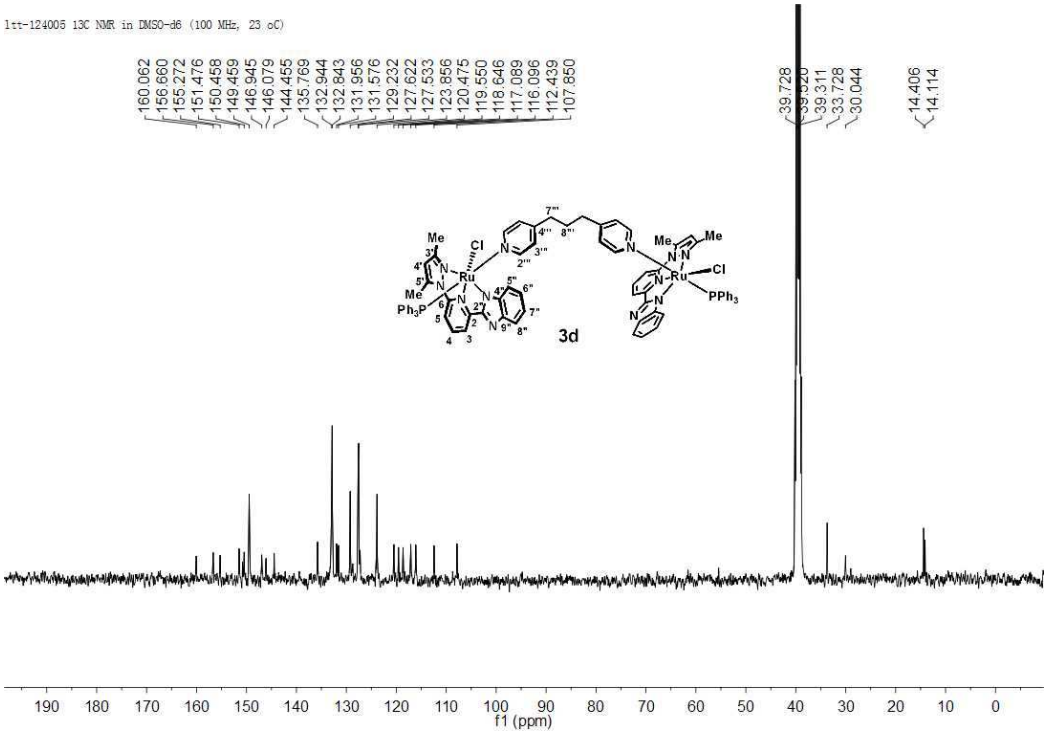

Figure S12. ^{13}C NMR spectrum of complex **3d** (DMSO-d_6, 100 MHz, 23 ^{o}C).

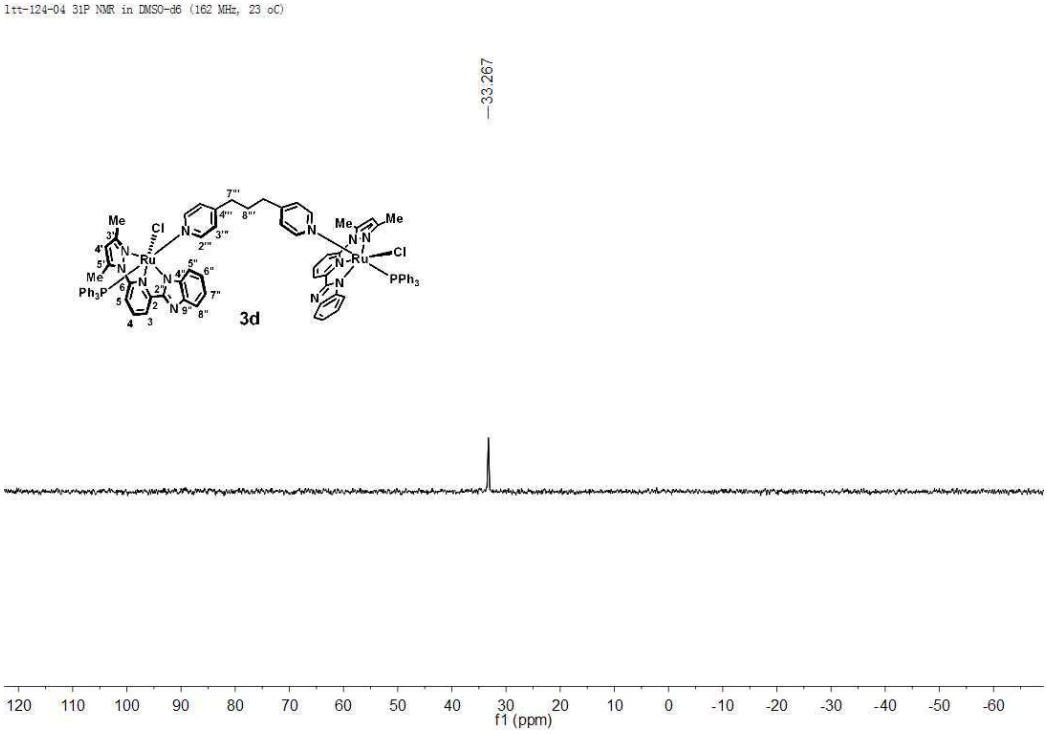

Figure S13. ^{31}P NMR spectrum of complex **3d** (DMSO-d_6, 162 MHz, 23 ^{o}C).

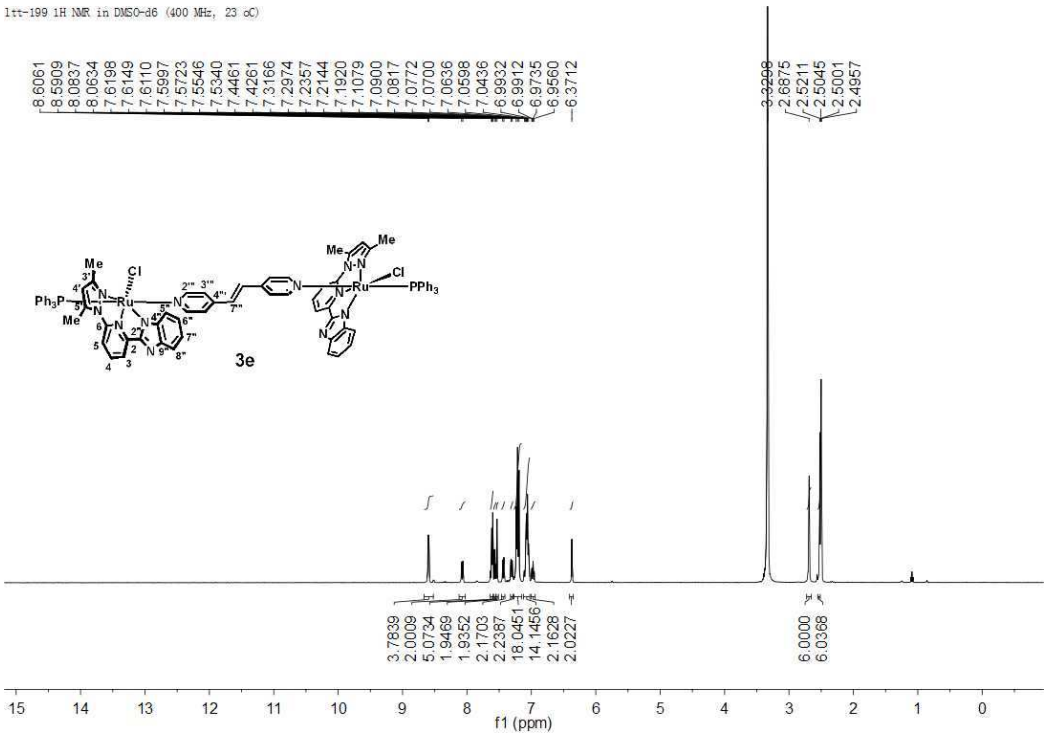

Figure S14. ^{1}H NMR spectrum of complex **3e** (DMSO-d_6, 400 MHz, 23 ^{o}C).

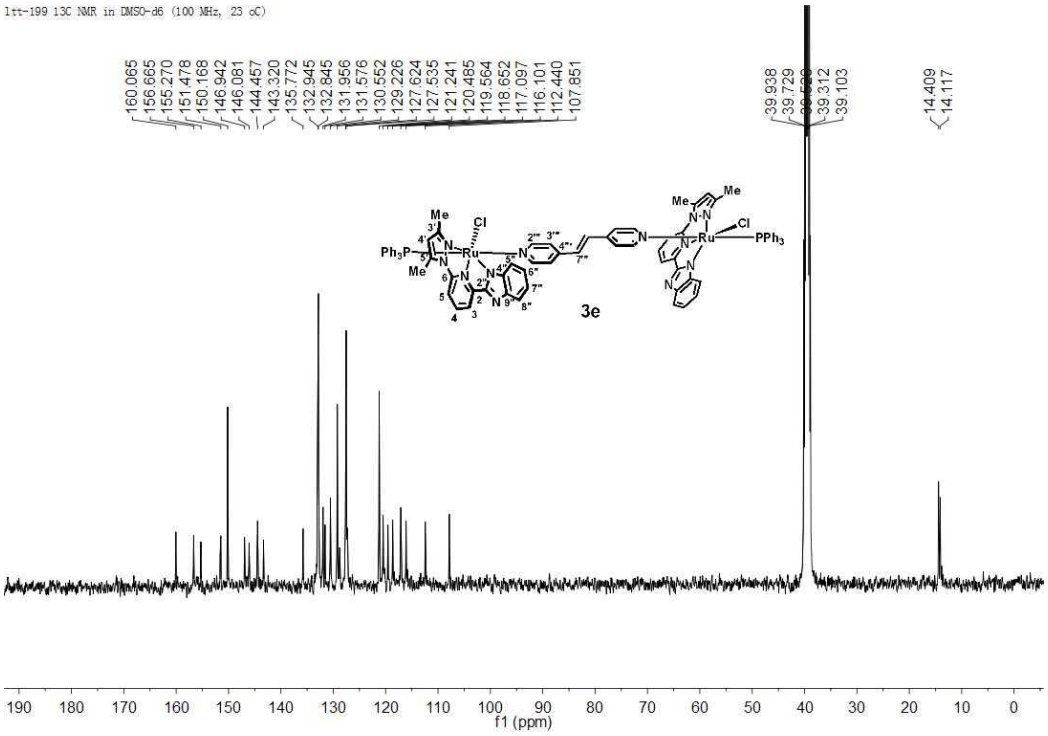

Figure S15. ^{13}C NMR spectrum of complex **3e** (DMSO-d_6, 100 MHz, 23 ^{o}C).

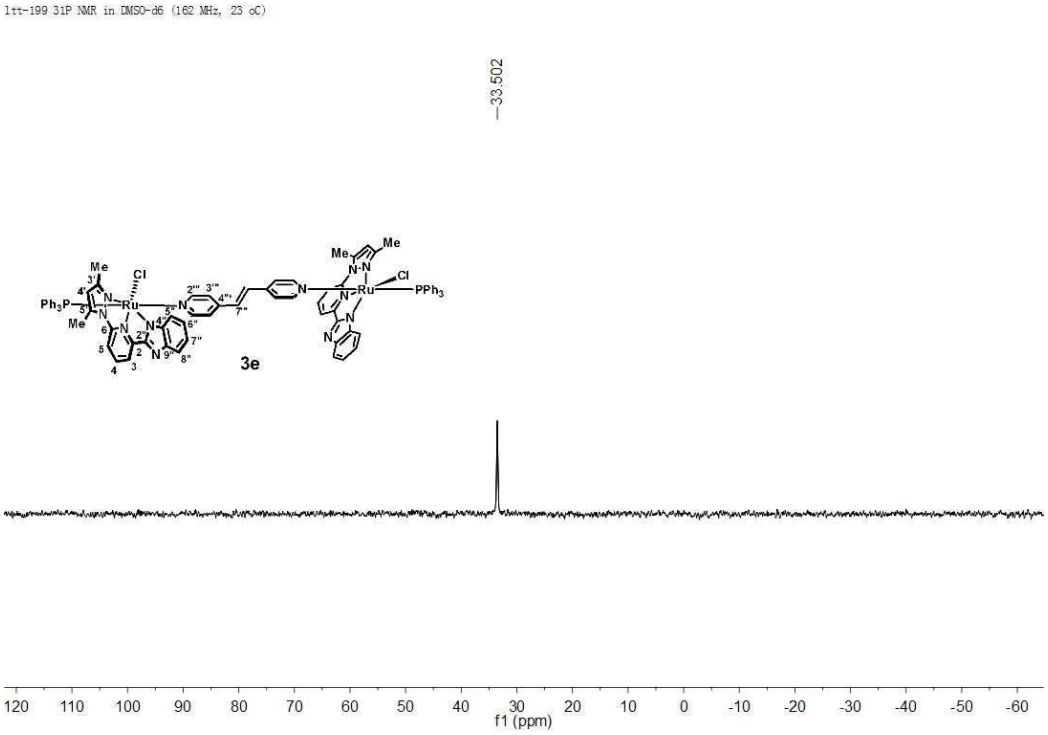

Figure S16. ^{31}P NMR spectrum of complex **3e** (DMSO-d_6, 162 MHz, 23 ^{o}C).

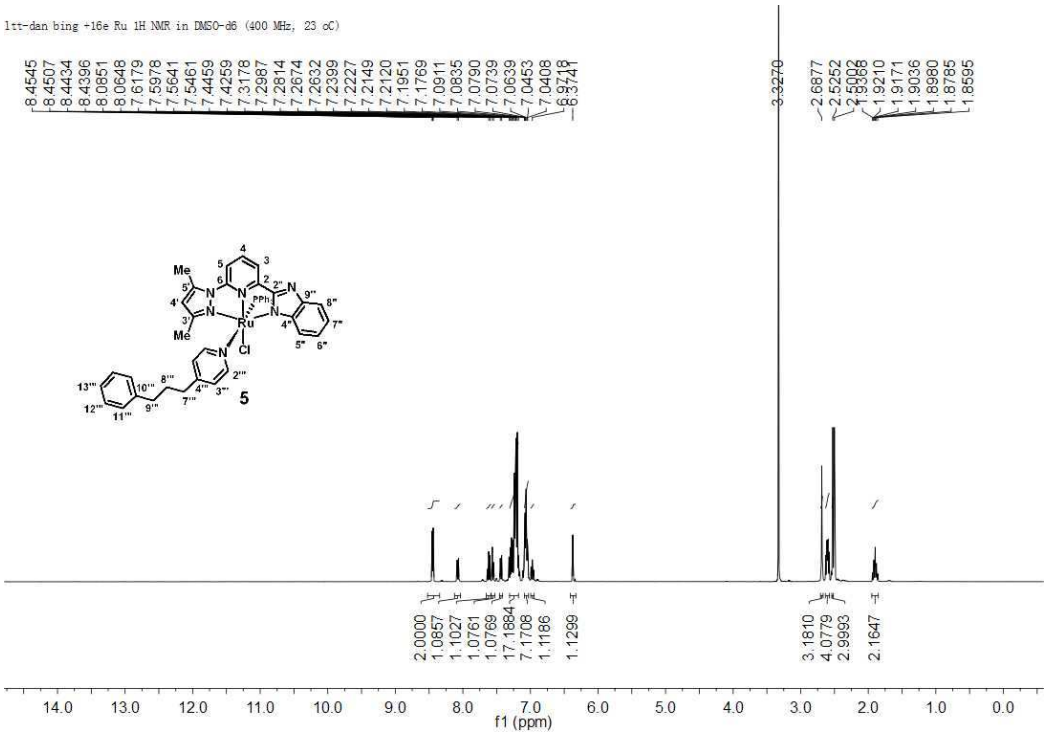

Figure S17. ^{1}H NMR spectrum of complex **5** (DMSO-d_6, 400 MHz, 23 ^{o}C).

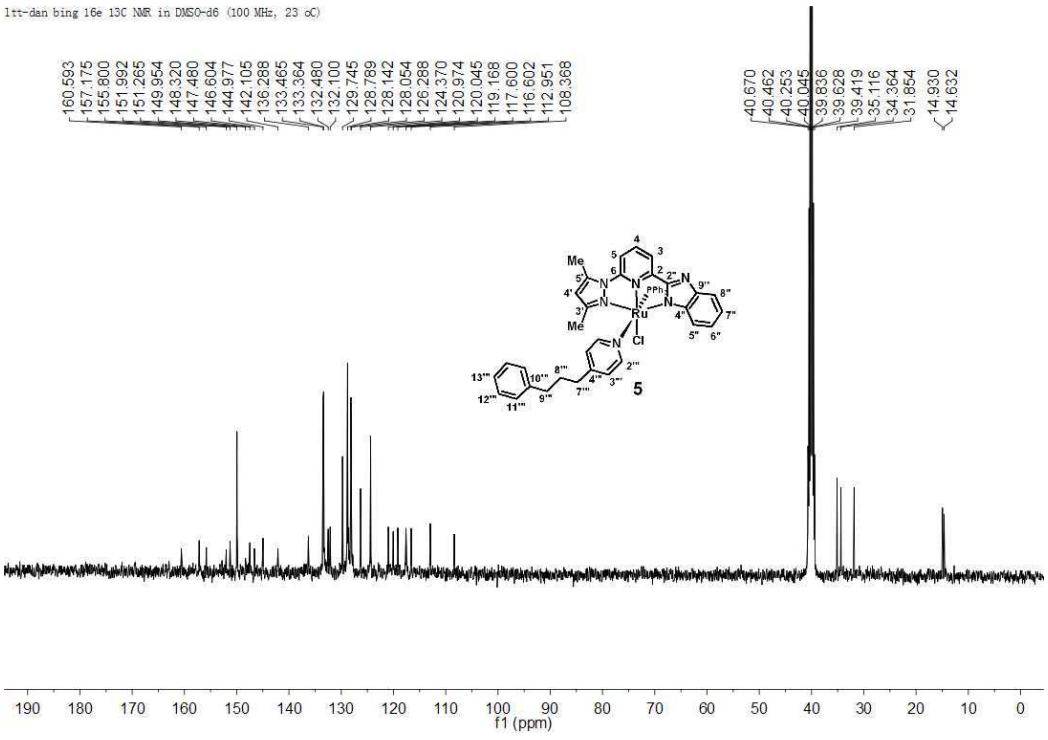

Figure S18. ^{13}C NMR spectrum of complex **5** (DMSO-d_6, 100 MHz, 23 ^{o}C).

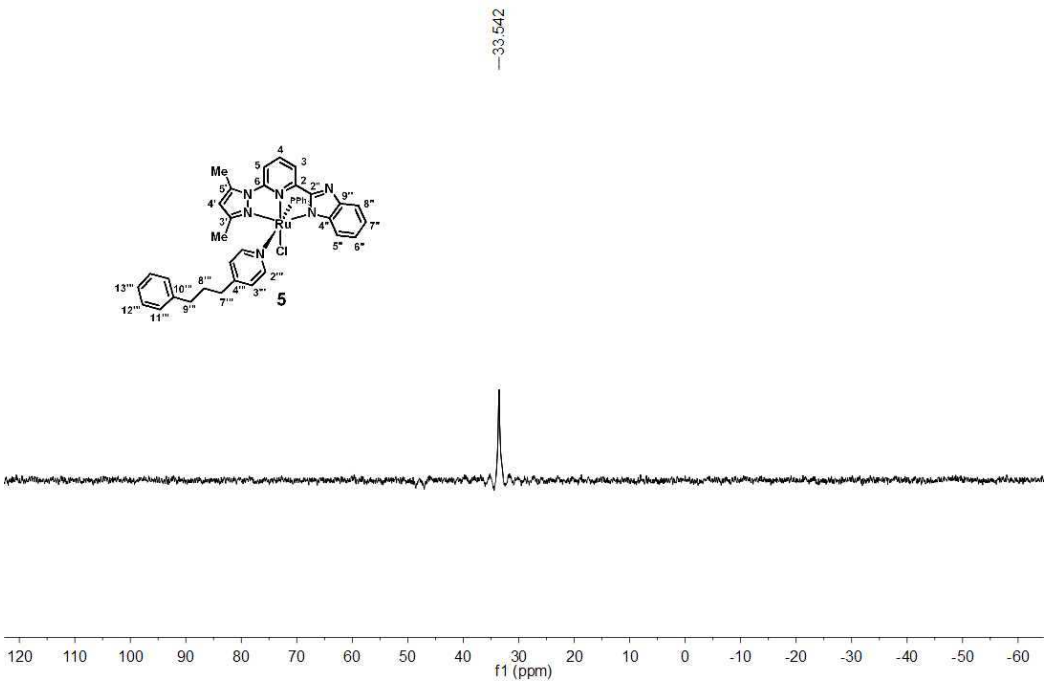

Figure S19. ^{31}P NMR spectrum of complex **5** (DMSO-d_6, 162 MHz, 23 ^{o}C).