SUPPORTING INFORMATION

Syntheses, crystal structures, and magnetic properties of cyanide-bridged complexes *trans*-$Ru^{II}(dppe)_2(CN)_2(Fe^{III}X_3)_2$ (X = Cl and Br)

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Table S1. Crystallographic Data and Details of Structure Determination for Complexes **1-3**

Complex	**1**·2C_3H_8O	**2**	**3**
Chemical formula	$C_{59.73}H_{64}Cl_{0.27}N_{1.74}O_2P_4Ru$	$C_{53.71}H_{48}Cl_{6.30}Fe_2N_{1.71}P_4Ru$	$C_{54}H_{48}Br_6Fe_2N_2P_4Ru$
Formula weight	1072.58	1277.07	1541.05
Colour and Habit	Yellow prism	Red prism	Brown prism
Crystal Size / mm	0.367×0.336×0.133	0.281×0.162×0.127	0.452×0.236×0.128
T / K	123	123	123
Crystal system	Orthorhombic	Monoclinic	Triclinic
Space group	*Pccn*	$P2_1/n$	*P*-1
a / Å	22.513(9)	10.550(3)	11.495(4)
b /Å	13.334(5)	17.457(4)	11.698(4)
c / Å	17.261(7)	14.548(4)	12.087(5)
α / deg	90.00	90.00	109.785(3)
β / deg	90.00	97.216(4)	103.350(3)
γ / deg	90.00	90.00	103.136(3)
V / Å^3	5182(4)	2658.0(12)	1402.9(9)
Z	4	2	1
ρ_{calcd}(g/cm^3)	1.375	1.596	1.824
λ (Mo K_α, Å)	0.71073	0.71073	0.71073
μ(Mo K_α, mm^{-1})	0.485	1.295	5.200
Completeness	97.6%	99.7%	97.0%
F(000)	2236	1290	752
h, k, l, range	-29≤h≤27, -17≤k≤17, -22≤l≤21	-13≤h≤13, -22≤k≤21, -17≤l≤18	-14≤h≤14, -15≤k≤15, -15≤l≤15
θ range / deg	2.53-27.41	2.54-27.53	2.84-27.47
Reflections measured	5774	6116	6224
R_{int}	0.0460	0.0392	0.0337
Params/restraints/Data(obs.)	325/18/5582	323/36/5225	313/0/5845
GOF	1.007	1.011	1.008
R_1, $_\omega R_2$ (I>2σ(I))	0.0363, 0.0952	0.0380, 0.1045	0.0358, 0.0971
R_1, $_\omega R_2$ (all data)	0.0375, 0.0963	0.0435, 0.1074	0.0376, 0.0990

Table S2. Selected Bond Lengths (Å) and Bond Angles (deg) for Complexes **1-3**

Complex	**1**	**2**	**3**
Ru-C	2.084(9)	2.007(17)	2.012(3)
Ru-Cl	2.45(2)	2.33(3)	
Ru1-P1	2.3896(8)	2.3954(9)	2.4001(9)
Ru1-P2	2.3622(7)	2.4135(9)	2.3924(9)
C≡N	1.143(11)	1.161(18)	1.141(3)
C-Ru-C	180.0(1)	180.0(2)	180.0(1)
N≡C-Ru	175.7(9)	177.3(14)	176.7(2)
C≡N-Fe		165.2(9)	165.2(2)
Fe-N1		1.957(5)	1.966(2)
Fe-X1		2.1569(12)	2.3161(9)
Fe-X2		2.1830(11)	2.3288(7)
Fe-X3		2.1745(11)	2.3194(10)
Fe···Ru		5.075	5.068
Fe···Fe(intramolecular)		10.150	10.137
Fe···Fe(intermolecular)		7.439	6.822
Ru···Fe(-NC-)		5.124	5.119
Fe···Fe(-NC-Ru-CN-)		10.248	10.238

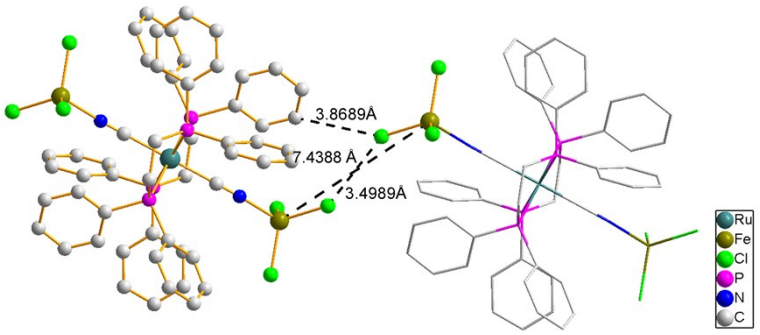

Figure S1 Packing structure of complex **2.**

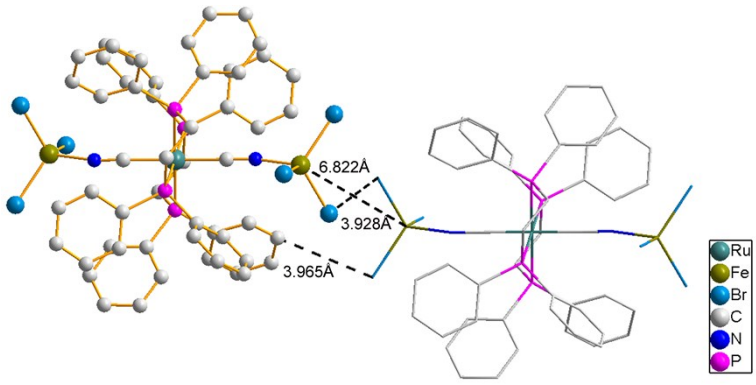

Figure S2 Packing structure of complex **3.**

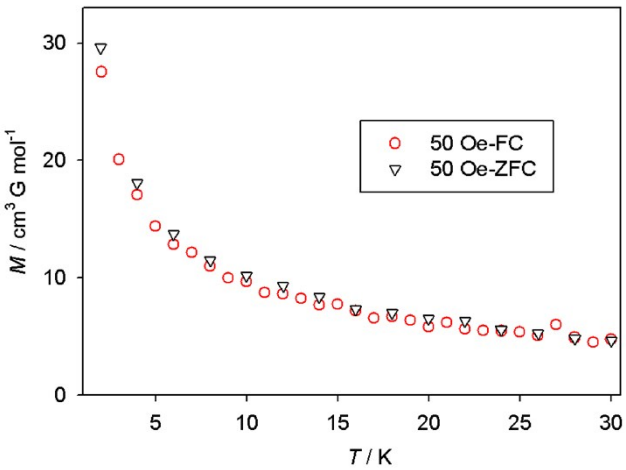

Figure S3 ZFC and FC magnetization of **2** at 50 Oe warming from 2 K to 30 K

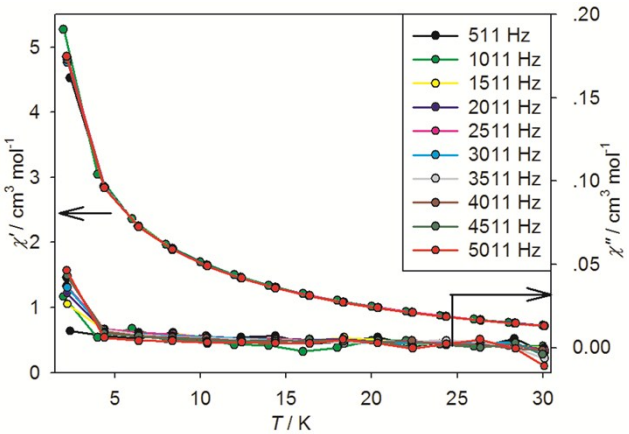

Figure S4. Temperature dependence of the in-phase and out-of-phase ac susceptibility for **2** in zero dc and 3 Oe ac applied field

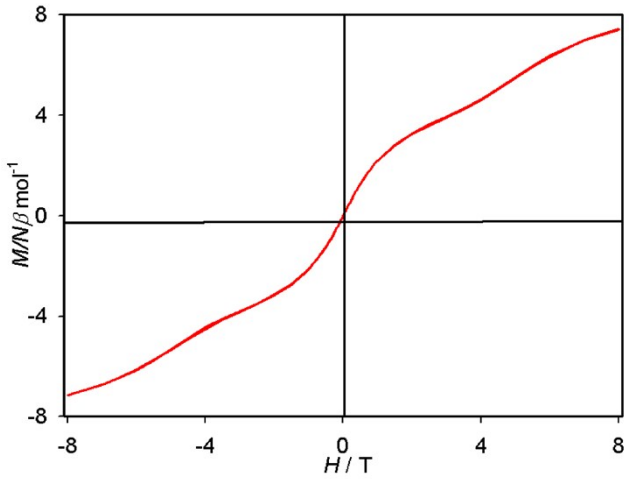

Figure S5. Plot of $M/N\beta$ vs H for the sample **2** at 2 K.

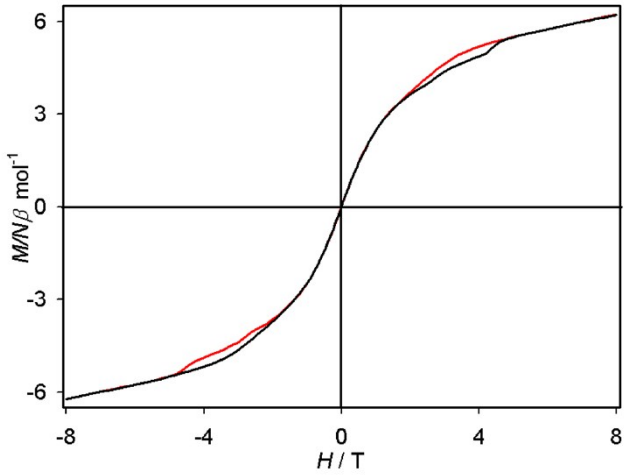

Figure S6 Plot of $M/N\beta$ vs H for the sample **3** at 2 K.

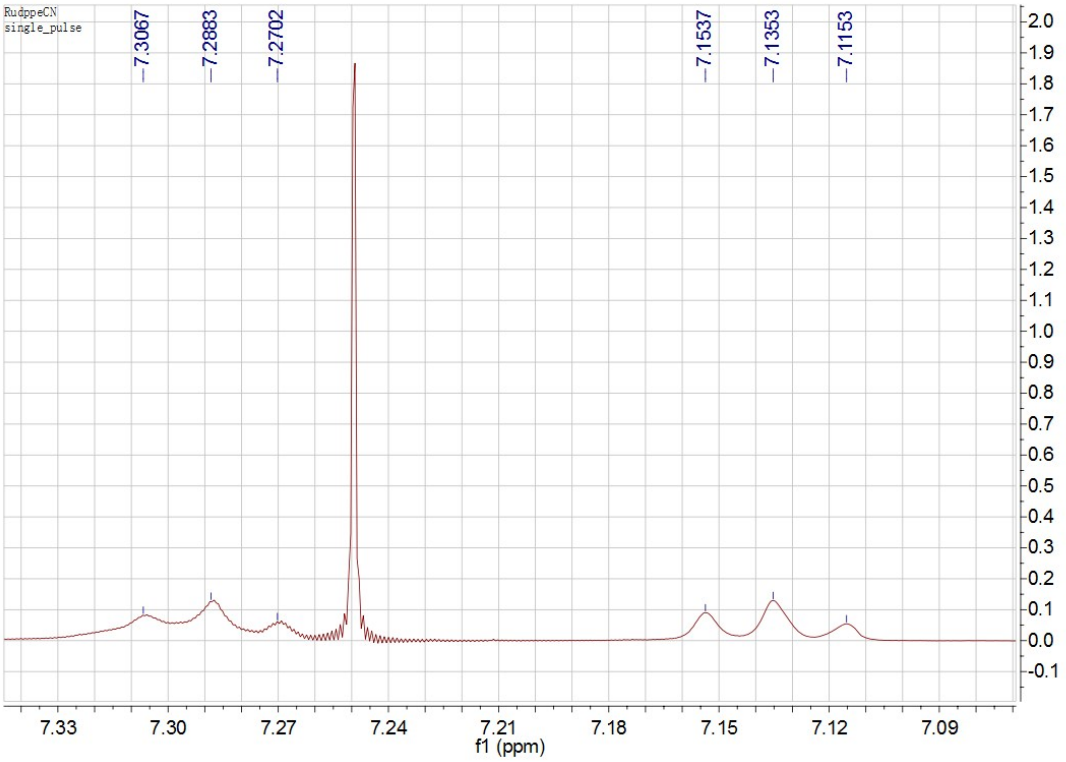

Figure S7 ^{1}H NMR of complex **1** in $CDCl_3$

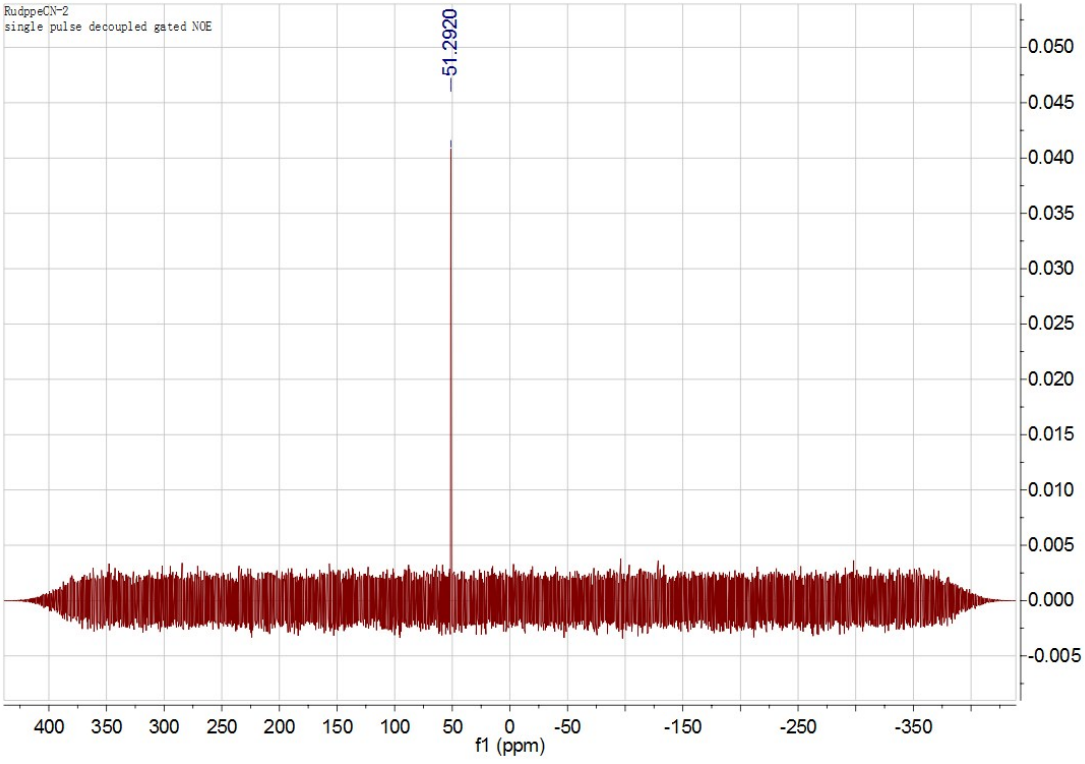

Figure S8 ^{31}P NMR of complex **1** in $CDCl_3$