

Supporting information

Heterotrimetallic paramagnetic complex of ring reduced tin (II) hexadecachlorophthalocyanine

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Optical properties

Table S1. IR-spectra (cm⁻¹) of starting macrocycle and salts **1** and **2** measured in KBr pellets.

Components	cryptand	{CpFe(CO) ₂ } ₂	C ₆ H ₄ Cl ₂	SnCl ₂ PcCl ₁₆	Cp ₂ Cr	1	2
SnCl ₂ PcCl ₁₆				518s		-	515s
				540w		-	-
				605w		599w*	598w
				644w		-	-
				667w		658w*	-
				738s		723m	716m
				767s		763s	759s*
				787s		779m	785s
				795s		-	-
				817w		811w	814w
				828w		-	-
				861w		856w	-
				896w		-	-
				945s		945m	949s*
				969m		-	-
				1022w		-	1032m*
				1093s		1084m	-
				1134s		1134s	1132s*
				1203s		1208m	1204w*
				1273s		1273m	1263s
				1296s		1302s	1304s*
				1332s		-	-
				1387s		1387m	1393s
				1450w		1456m*	1454m*
				1474w		-	1474w
				1503w		-	-
				1561w		1570w	1560w
				1590w		-	-
				1630w		1630w	-
				2349w		-	-
				2373w		-	-
				2420w		-	-
				2546w		-	-
				2585w		-	-
			2624w		-	-	
			2850w		2855w*	-	
			2875w		-	2882m*	
			2922w		2914w	-	
			2959w		-	-	
cryptand	476w						473w
	528w						-
	581w						-
	735m						-
	922m						-
	948w						949s*
	982m						-
	1038w						1032m*
	1071m						1076s
	1100s						1105s
	1127s						1132s*
	1213w						1204w*
	1295m						1304s*
	1329m						-
	1360s						1354m
	1446m						1454m*
	1462m						-
	1490w						-
	2790w						-
	2877w						2882m*
2943w						-	

C ₆ H ₄ Cl ₂			663w 751s 1035m 1120s 1462m			658w* - 1034m - 1456m*	656w 758s* 1032m* - 1454m*
Cp ₂ Fe ₂ (CO) ₄		542w 565w 595w 648m 830w 1016w CO 1756s 1771s 1936s 1956s				- - 599w* 658w* - - - CO - 1983s 2026s	
Cp ₂ Cr					587w 800w 1019m 1067w 1262w 1375m 1417w 1446w 2851w 2955w	579m - - - - - - 1456m* 2855w* -	

* - bands are coincided, w – weak, m –middle and s – strong intensity

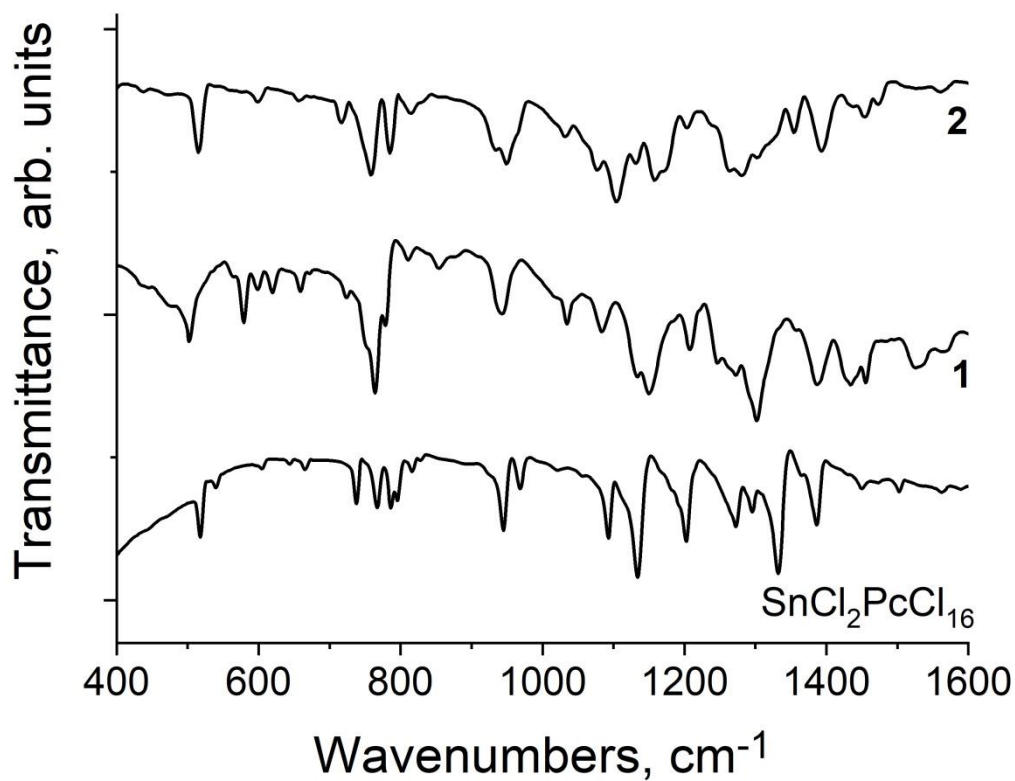


Figure S1. IR spectra of pristine neutral SnCl₂PcCl₁₆ and salts **1** and **2** in KBr pellets prepared in anaerobic condition.

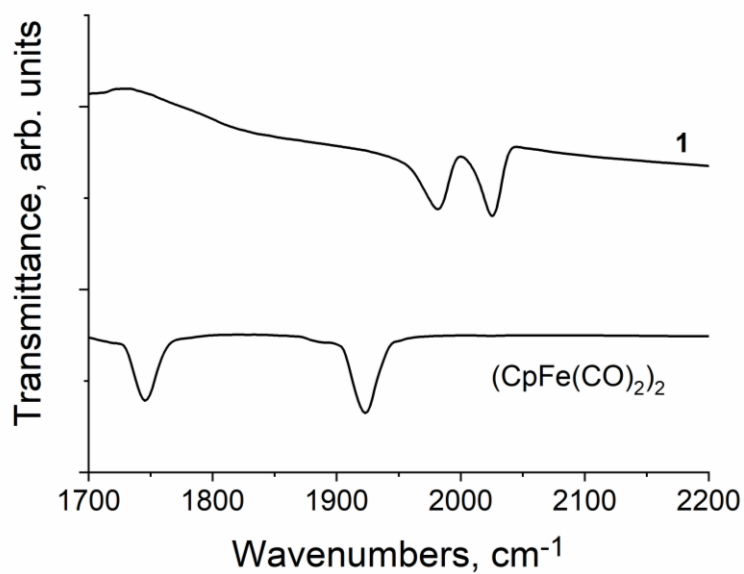


Figure S2. IR spectra of starting (CpFe(CO)₂)₂ and salt **1** in 1700 – 2200 cm⁻¹ range in KBr pellets prepared in anaerobic conditions

Crystal structure

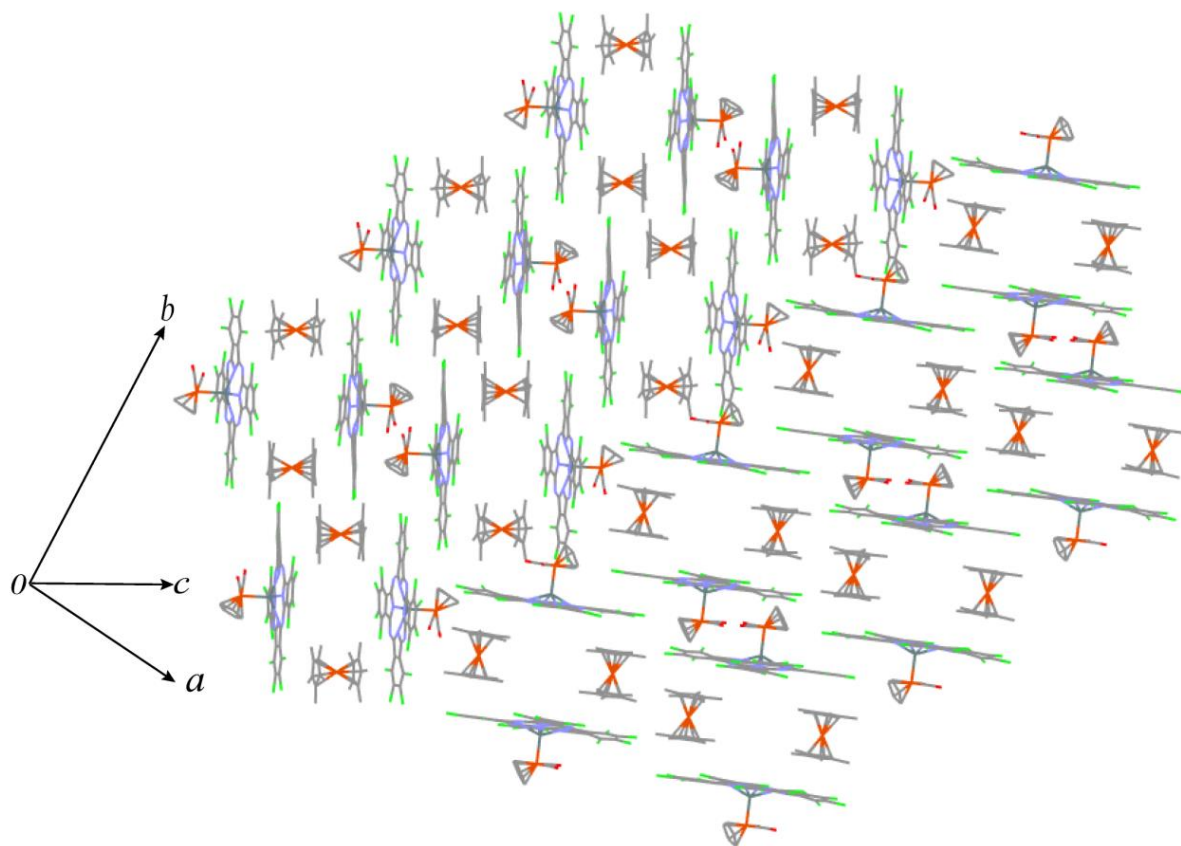


Figure S3. Structure of two types of the layers from sandwiches in $(\text{Cp}^*_2\text{Cr}^{\text{III}})^+\{\text{CpFe}^{\text{II}}(\text{CO})_2(\text{Sn}^{\text{II}}[\text{PcCl}_{16}]^{4-})\}^-$ (**1**)

Magnetic properties

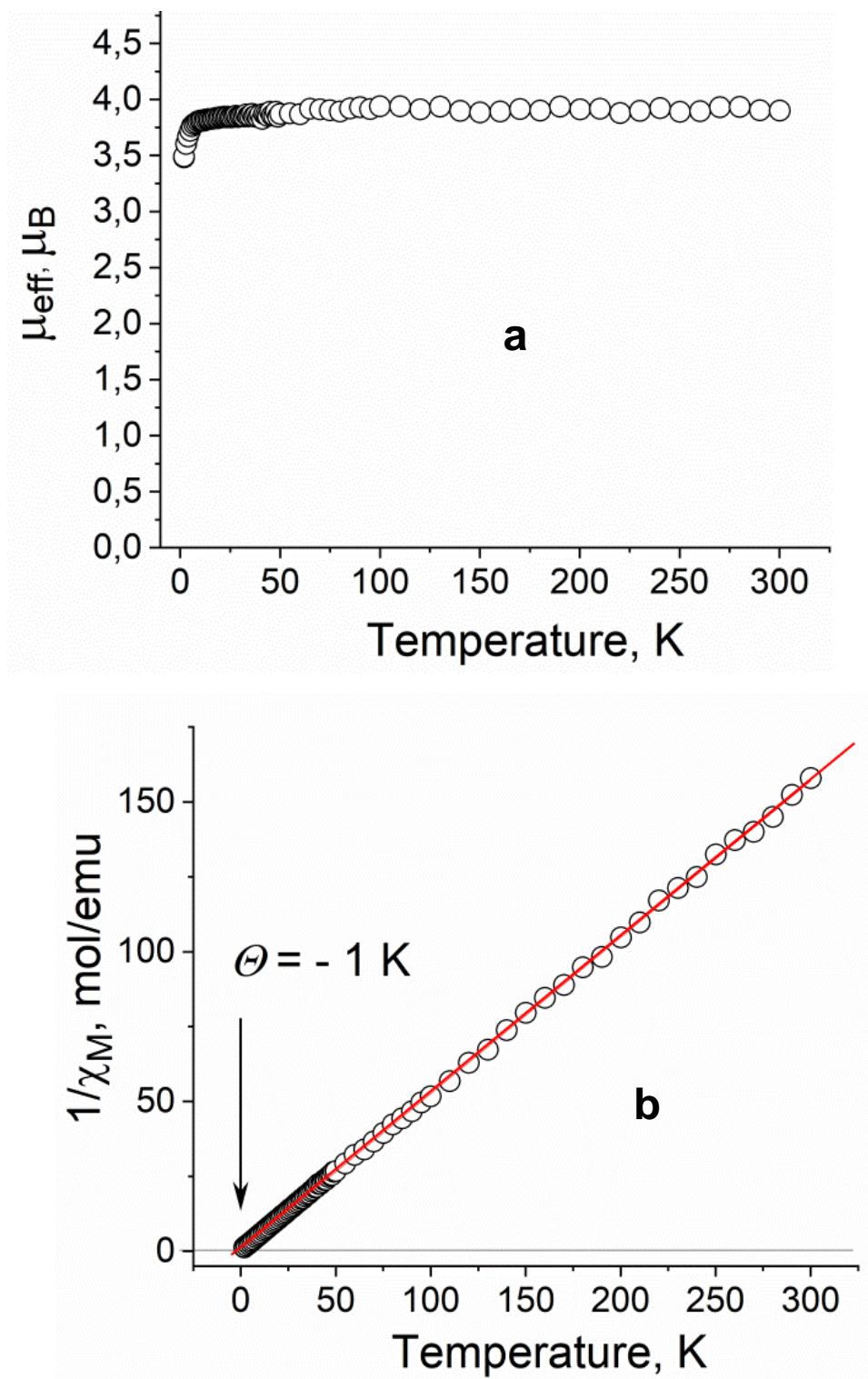


Figure S4. Temperature dependence of effective magnetic moment (a) and reciprocal molar magnetic susceptibility (b) for $(\text{Cp}_2\text{Cr}^{\text{III}})^+\{\text{CpFe}^{\text{II}}(\text{CO})_2(\text{Sn}^{\text{II}}[\text{PcCl}_{16}]^{4-})\}^-$ (**1**).

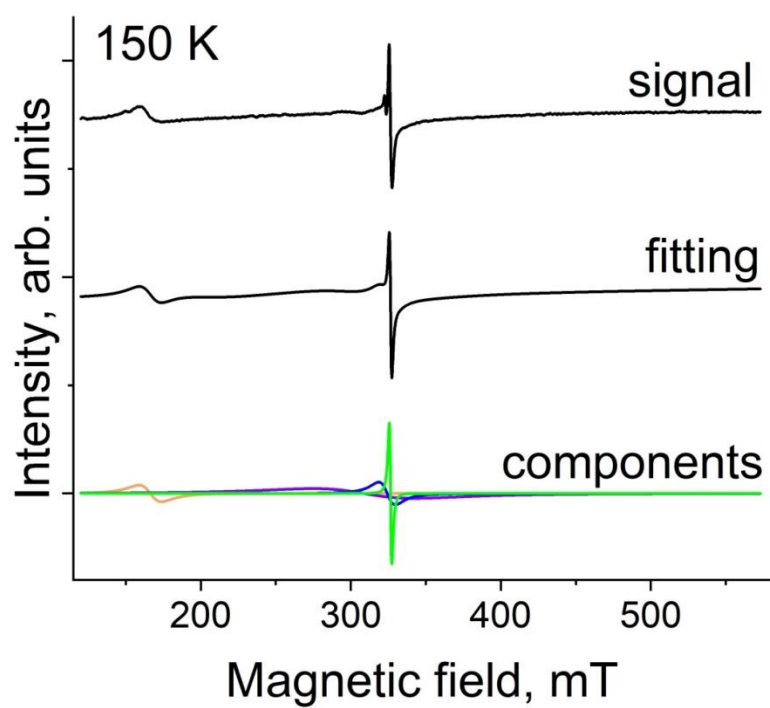


Figure S5. EPR spectrum of the polycrystalline sample of **1** measured in an anaerobic condition.