Electronic Supplementary Material (ESI) for Dalton Transactions.

New copper(I) complexes selective for prostate cancer cells

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Table S1 - Electronic spectra data for free ligands, precursors and complexes **1**–**16** of general formula [Cu(PP)(LL)][BF_4], in dichloromethane solutions.

Compound	λ_{max} (nm) (ε M^{-1} cm^{-1})	Compound	λ_{max} (nm) (ε M^{-1} cm^{-1})	Compound	λ_{max} (nm) (ε M^{-1} cm^{-1})	Compound	λ_{max} (nm) (ε M^{-1} cm^{-1})
Precursors							
		1		**2**			
PP=2PPh_3	259 (sh)	PP=2*m*TPPMS	266 (20400)	PP=2*p*MPP	245 (83700)	PP=dppe	266 (15200)
LL = 2$NCMe_2$	279 (sh)	LL=2$NCMe_2$	–	LL=2NCMe	263 (sh)	LL = 2$NCMe_2$	273 (sh)
Ligands							
bopy	–	2-ap	243 (7170)	2-apz	270 (11800)	isoquinpk	–
	263 (14400)		268 (11100)		307 (764)		254 (16500)
	352 (262)		329 (214)		357 (sh)		323 (5250)
Complexes							
3		**7**		**11**		**15**	
PP=2PPh_3	272 (31600)	PP=2*m*TPPMS	266 (39800)	PP=2*p*MPP	241 (99800)	PP= dppe	274 (37400)
LL = bopy	–	LL=bopy	364 (sh)	LL=bopy	264 (sh)	LL=bopy	–
	415 (2640)		431 (sh)		447 (1900)		494 (2940)
4		**8**		**12**		**16**	
PP=2PPh_3	265 (49300)	PP=2*m*TPPMS	267 (26200)	PP=2*p*MPP	242 (68800)	PP= dppe	267 (20500)
LL = 2-ap	–	LL=2-ap	–	LL=2-ap	264 (sh)	LL=2-ap	294 (sh)
	396 (4090)		406 (sh)		417 (2240)		457 (2830)
5		**9**		**13**		**17**	
PP=2PPh_3	264 (31300)	PP=2*m*TPPMS	269 (30100)	PP=2*p*MPP	246 (78200)	PP=dppe	269 (14000)
LL = 2-apz	–	LL=2-apz	364 (sh)	LL=2-apz	263 (sh)	LL=2-apz	367 (sh)
	426 (2290)		435 (sh)		457 (1630)		502 (913)
6		**10**		**14**		**18**	
PP=2PPh_3	261 (sh)	PP=2*m*TPPMS	255 (24300)	PP=2*p*MPP	243 (74000)	PP=dppe	259 (sh)
LL=isoquinpk	324 (sh)	LL=isoquinpk	322 (4310)	LL=isoquinpk	262 (sh)	LL=isoquinpk	–
	357 (sh)		–		323 (4680)		326 (sh)
	432 (sh)		–		441 (1650)		506 (767)

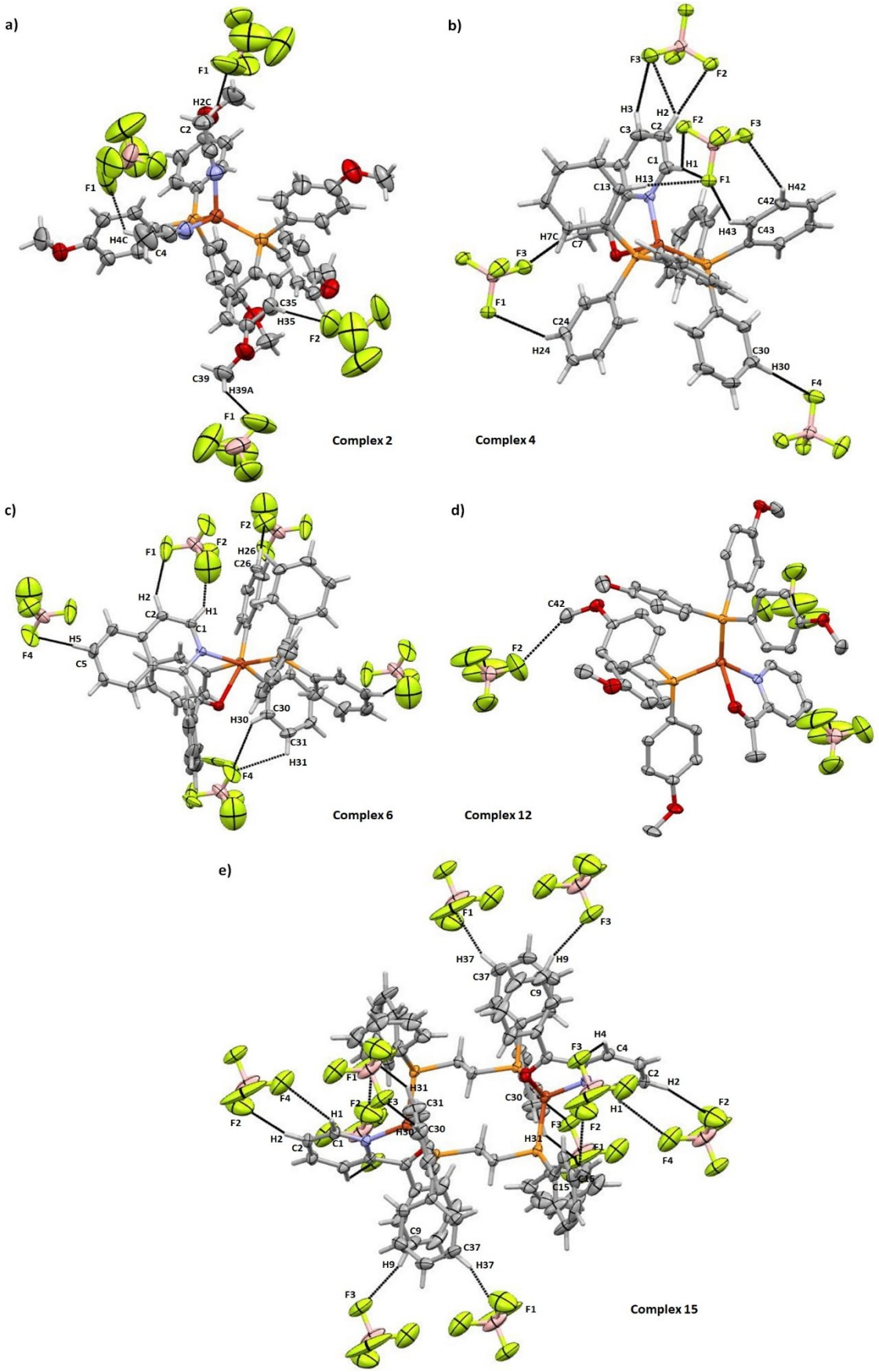

Figure S1 - Intermolecular interactions for complexes [Cu(*p*MPP)$_2$(NCMe)$_2$][BF$_4$] (a), [Cu(PPh$_3$)$_2$(2-ap)][BF$_4$] (b), [Cu(PPh$_3$)$_2$(isoquinpk)][BF$_4$] (c), [Cu(pMPP)$_2$(2-ap)] [BF$_4$] (d), and [Cu$_2$(μ-dppe)$_2$(bopy)$_2$][BF$_4$]$_2$ (e).

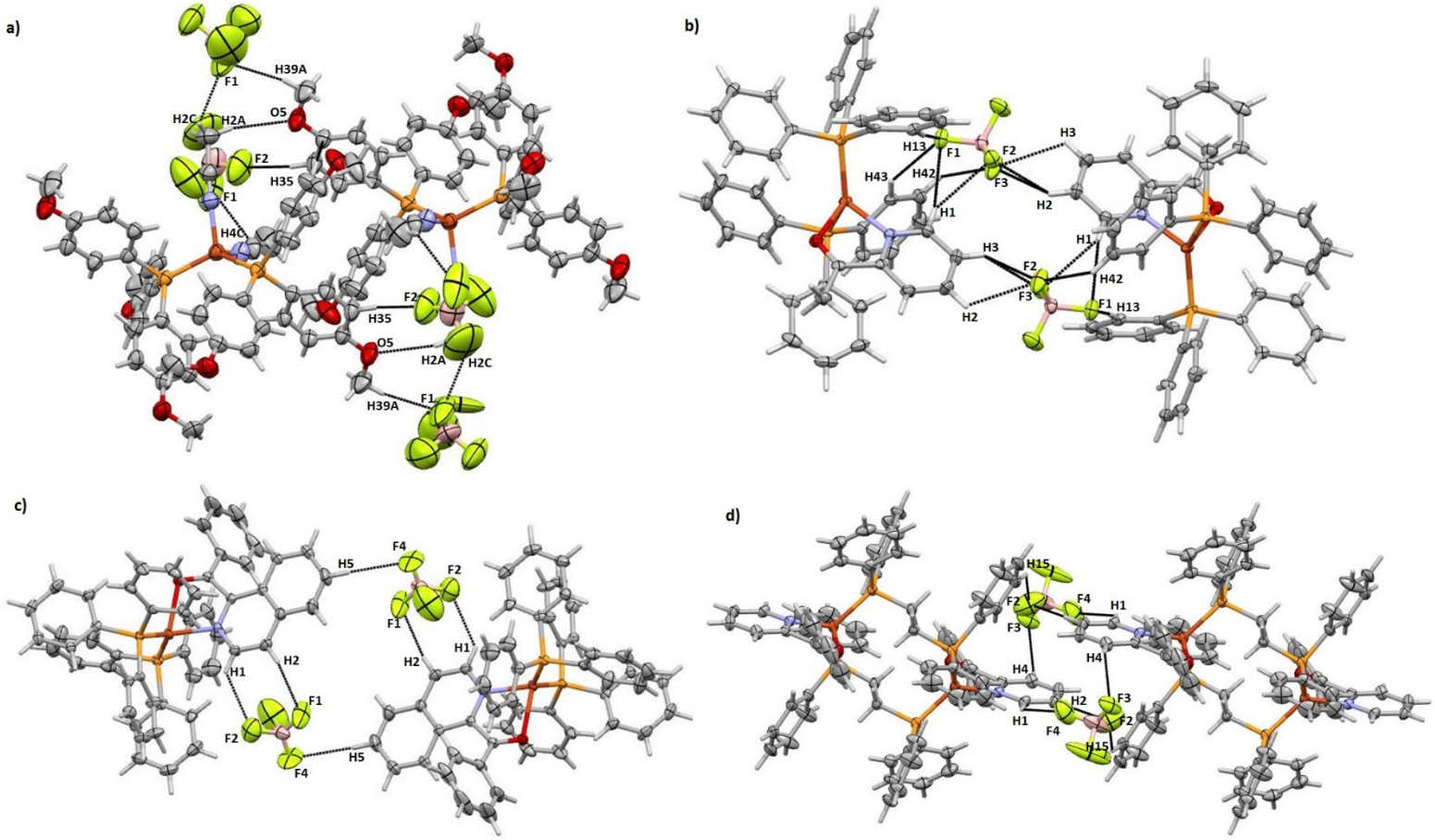

Figure S2 – Dimers formed by two independent molecules of complexes [Cu(*p*MPP)$_2$(NCMe)$_2$][BF_4] (a), [Cu(PPh_3)$_2$(2-ap)][BF_4] (b), [Cu(PPh_3)$_2$(isoquinpk)][BF_4] (c) and [Cu_2(μ-dppe)$_2$(bopy)$_2$][BF_4]$_2$ (d).

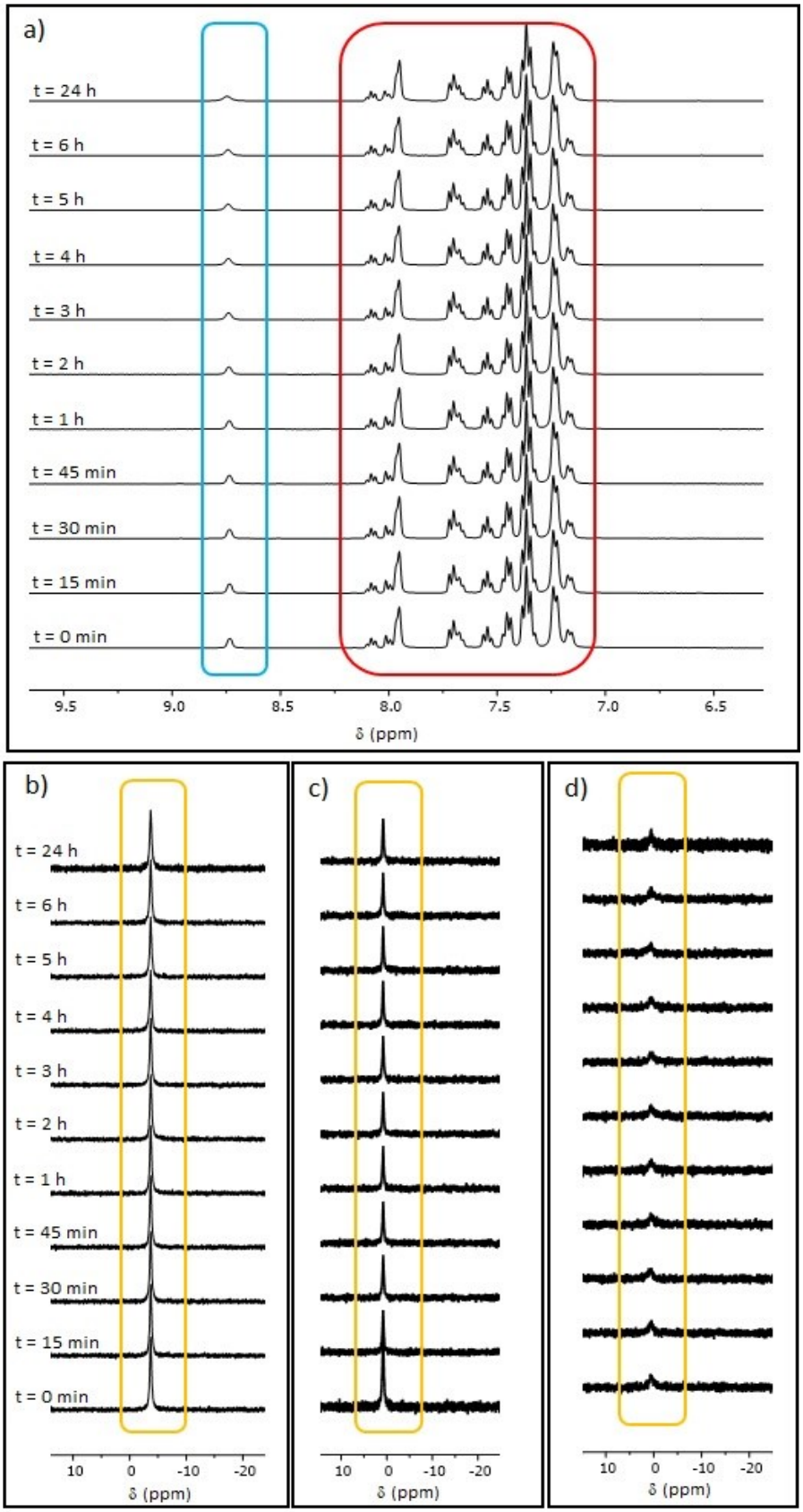

Figure S3 – Evaluation of complex 7 by ^{1}H NMR in DMSO (a); and ^{31}P NMR in DMSO (b), 5%DMSO-H_2O (C) and 5%DMSO-DMEM (d) over 24 h.

Table S2 – IC_{50} values found for compounds **3** - **16**, precursors, free ligands and cisplatin in the breast adenocarcinoma MCF7 cells, prostate LnCap cells and healthy prostate RWPE cells (24h, 37 °C).

Compound	IC_{50} (μm)		
	MCF7	LnCap	RWPE
Precursors			
$[Cu(PPh_3)_2(NCMe)_2][BF_4]$	13.4 ± 5.3	1.40 ± 0.35	–
$[Cu(mMTPPMS)_2(NCMe)_2][BF_4]$ (**1**)	84.6 ± 20.5	32.30 ± 9.5	–
$[Cu(pMPP)_2(NCMe)_2][BF_4]$ (**2**)	6.70 ± 1.5	6.05 ± 2.1	–
$[Cu(dppe)(NCMe)_2][BF_4]$	6.56 ± 2.4	0.10 ± 0.02	–
Ligands			
Bopy	>100	–	–
2-ap	>100	–	–
2-apz	>100	–	–
isoquipk	>100	–	–
PPh_3	85.50 ± 21.7	–	–
*m*MTPPMS	>100	–	–
*p*MPP	>100	–	–
dppe	>100	–	–
Complexes			
$[Cu(PPh_3)_2(bopy)][BF_4]$ (**3**)	7.62 ± 2.2	0.43 ± 0.16	7.52 ± 2.2
$[Cu(PPh_3)_2(2\text{-}ap)][BF_4]$ (**4**)	8.10 ± 2.1	0.54 ± 0.20	9.53 ± 3.0
$[Cu(PPh_3)_2(2\text{-}apz)][BF_4]$ (**5**)	6.60 ± 1.9	0.63 ± 0.44	6.52 ± 2.3
$[Cu(PPh_3)_2(isoquinpk)][BF_4]$ (**6**)	7.45 ± 2.4	0.88 ± 0.25	5.96 ± 1.0
$[Cu(mMTPPMS)_2(bopy)][BF_4]$ (**7**)	79.40 ± 17.8	15.50 ± 8.2	–
$[Cu(mMTPPMS)_2(2\text{-}ap)][BF_4]$ (**8**)	74.60 ± 21.6	23.70 ± 6.9	–
$[Cu(mMTPPMS)_2(2\text{-}apz)][BF_4]$ (**9**)	80.80 ± 25	10.50 ± 3.5	–
$[Cu(mMTPPMS)_2(isoquinpk)][BF_4]$ (**10**)	3.40 ± 0.75	0.86 ± 0.2	19.60 ± 6.7
$[Cu(pMPP)_2(bopy)][BF_4]$ (**11**)	15.50 ± 5.6	1.96 ± 0.71	29.10 ± 11
$[Cu(pMPP)_2(2\text{-}ap)][BF_4]$ (**12**)	3.33 ± 0.8	1.14 ± 0.4	21.60 ± 6.4
$[Cu(pMPP)_2(2\text{-}apz)][BF_4]$ (**13**)	56.90 ± 12.7	60.80 ± 20	–
$[Cu(pMPP)_2(isoquipk)][BF_4]$ (**14**)	5.76 ± 1.7	1.84 ± 0.6	18.70 ± 5.5
$[Cu(dppe)(bopy)][BF_4]$ (**15**)	3.03 ± 1.24	1.97 ± 0.02	–
$[Cu(dppe)(2\text{-}ap)][BF_4]$ (**16**)	1.96 ± 0.86	0.20 ± 0.03	13.90 ± 3.9
$[Cu(dppe)(2\text{-}apz)][BF_4]$ (**17**)	10.60 ± 3.0	3.04 ± 1.1	–
$[Cu(dppe)(isoquinpk)][BF_4]$ (**18**)	6.51 ± 2.1	0.44 ± 0.16	10.30 ± 2.8
Cisplatin	45.00 ± 18	20.7 ± 5.5	

Table S3 - Data collection and structure refinement parameters for $[Cu(pMPP)_2(NCMe)_2][BF_4]$ (**2**), $[Cu(PPh_3)_2(2\text{-}ap)][BF_4]$ (**4**) and $[Cu(PPh_3)_2(isoquinpk)][BF_4]$ (**6**).

Compound	**2**	**4**	**6**
Empirical formula	$C_{46}H_{48}BCuF_4N_2O_6P_2$	$C_{43}H_{37}BCuF_4NOP_2$	$C_{52}H_{41}BCuF_4NOP_2$
Formula weight	937.15	796.02	908.15
T (K)	298(2)	150(2)	150(2)
Wavelength (Å)	0.71073	0.71073	0.71073
Crystal system	Monoclinic	Monoclinic	Triclinic
Space group	C 2/c	P 21/n	P -1
a (Å)	25.4340(18)	10.1481(6)	11.2004(6)
b (Å)	14.4471(10)	15.2715(8)	11.2004(6)
c (Å)	25.2689(17)	24.6619(13)	16.8513(10)
α (°)	90	90	79.448(3)
β (°)	97.579(2)	90.862(3)	81.661(3)
γ (°)	90	90	66.911(3)
Volume ($Å^3$)	9203.9(11)	3821.6(4)	2179.6(2)
Z	8	4	2
Calculated density (mg m^{-3})	1.353	1.384	1.384
Absorption coefficient (mm^{-1})	0.609	0.710	0.632
F (000)	3888	1640	936
θ Range for data collection (°)	2.222 to 25.743	2.159 to 26.152	3.038 to 26.499
Limiting indices	-31 ≤ h ≤ 30, -17 ≤ k ≤ 17, -30 ≤ l ≤30	-12 ≤ h ≤ 12, -18 ≤ k ≤ 18, -30 ≤ l ≤ 23	-14 ≤ h ≤ 12, -16 ≤ k ≤ 16, -21 ≤ l ≤ 20
Reflections collected/unique	65019/8762 [R(int) = 0.0532]	29407/7597 [R(int) = 0.0656]	33721/8944 [R(int) = 0.0470]
Completeness to θ (%)	99.8	99.9	99.7
Refinement method	Full-matrix least-squares on F^2		
Data/restraints/parameters	8762 / 0 / 571	7597 / 0 / 478	8944 / 0 / 578
Goodness-on-fit on F^2	1.036	1.023	1.005
Final R indices [I > 2σ(I)]	R1 = 0.0453, wR2 = 0.1134	R1 = 0.0442, wR2 = 0.0957	R1 = 0.0481, wR2 = 0.1408
R indices (all data)	R1 = 0.0668, wR2 = 0.1295	R1 = 0.0759, wR2 = 0.1072	R1 = 0.0564, wR2 = 0.1486
Largest diff. peak and hole $(eÅ)^{-3}$	0.476 and -0.536	0.554 and -0.458	1.232 and -1.003

Table S4 - Data collection and structure refinement parameters for $[Cu(mMPP)_2(2\text{-ap})][BF_4]$ (**12**) and $[Cu(dppe)(bopy)][BF_4]$ (**15**).

Compound	**12**	**15**
Empirical formula	$C_{49}H_{49}BCuF_4NO_7P_2$	$C_{38}H_{33}BCuF_4NOP_2$
Formula weight	976.18	731.94
T (K)	150(2)	150(2)
Wavelength (Å)	0.71073	0.71073
Crystal system	Triclinic	Triclinic
Space group	P -1	P -1
a (Å)	11.3647(7)	12.2108(9)
b (Å)	14.0498(9)	12.8588(10)
c (Å)	16.4417(10)	13.1631(9)
α (°)	104.108(3)	67.715(3)
β (°)	108.859(3)	70.662(3)
γ (°)	99.858(3)	83.733(3)
Volume ($Å^3$)	2318.3(3)	1804.2(2)
Z	2	2
Calculated density (mg m^{-3})	1.398	1.347
Absorption coefficient (mm^{-1})	0.609	0.745
F (000)	1012	752
θ Range for data collection (°)	1.925 to 26.869	2.967 to 27.848
Limiting indices	$-14 \le h \le 13$, $-17 \le k \le 17$, $-20 \le l \le 20$	$-15 \le h \le 15$, $-16 \le k \le 16$, $-17 \le l \le 17$
Reflections collected/unique	37348 / 9851 [R(int) = 0.0453]	29238 / 8228 [R(int) = 0.0343]
Completeness to θ	99.6	98.9
Refinement method		
Data/restraints/parameters	9851 / 0 / 586	8228 / 0 / 443
Goodness-on-fit on F^2	0.997	0.988
Final R indices [$I > 2\sigma(I)$]	R1 = 0.0559, wR2 = 0.1613	R1 = 0.0518, wR2 = 0.1586
R indices (all data)	R1 = 0.0738, wR2 = 0.1766	R1 = 0.0656, wR2 = 0.1717
Largest diff. peak and hole $(eÅ)^{-3}$	1.819 and -0.931	1.944 and -0.497