Supporting Information

A heterotrimetallic Ir (III), Au (III) and Pt (II) complex incorporating cyclometallating bi- and tridentate ligands: simultaneous emission from different luminescent metal centres leads to broad-band light emission

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General details

The following palladium catalyst, *trans*-dichlorobis(triphenylphosphine)palladium(II) ($Pd(PPh_3)_2Cl_2$) was prepared from palladium(II) chloride (**(**$PdCl_2$) according to previously described procedures.[1] Palladium(II) chloride (**(**$PdCl_2$), copper(I) iodide (CuI), trimethylsilyl acetylene (TMSA), triethylamine (Et_3N) and all other reagents were used as purchased from standard chemical suppliers and used without further purification. TLC was performed on aluminium-backed plates coated with silica gel 60 (230-240 mesh) with F_{254} indicator. The spots were visualized with UV light (254 nm). All column chromatography were performed with silica gel 60 (35-70 μm) from Aldrich. The following known compounds were isolated as pure samples and showed identical NMR spectra to the reported compounds: **8**,[2] **9**,[3] **10**,[3] **11**,[3] **11**,[4] **12**,[5]

[1] N. Miyaura, A. Suzuki, *J. Chem. Soc., Chem. Commun.* **1979**, 866-867.

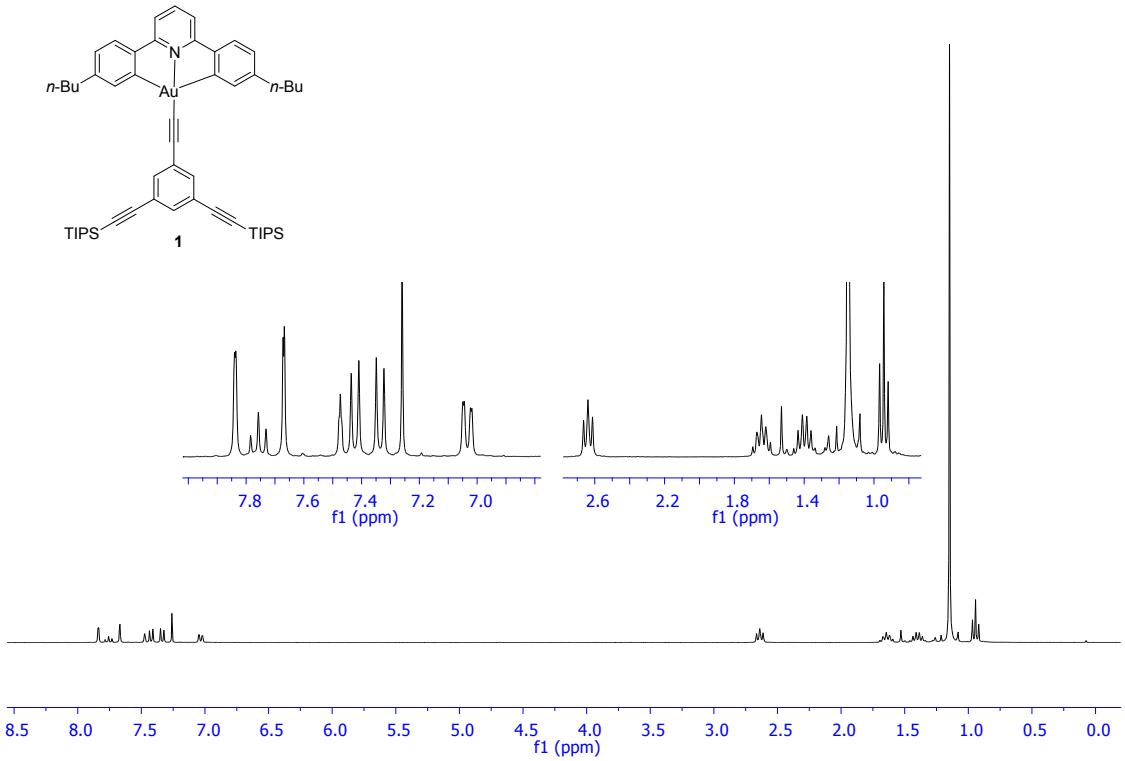
[2] K. L. Chandra, S. Zhang, C. B. Gorman, *Tetrahedron* **2007**, *63*, 7120-7132.

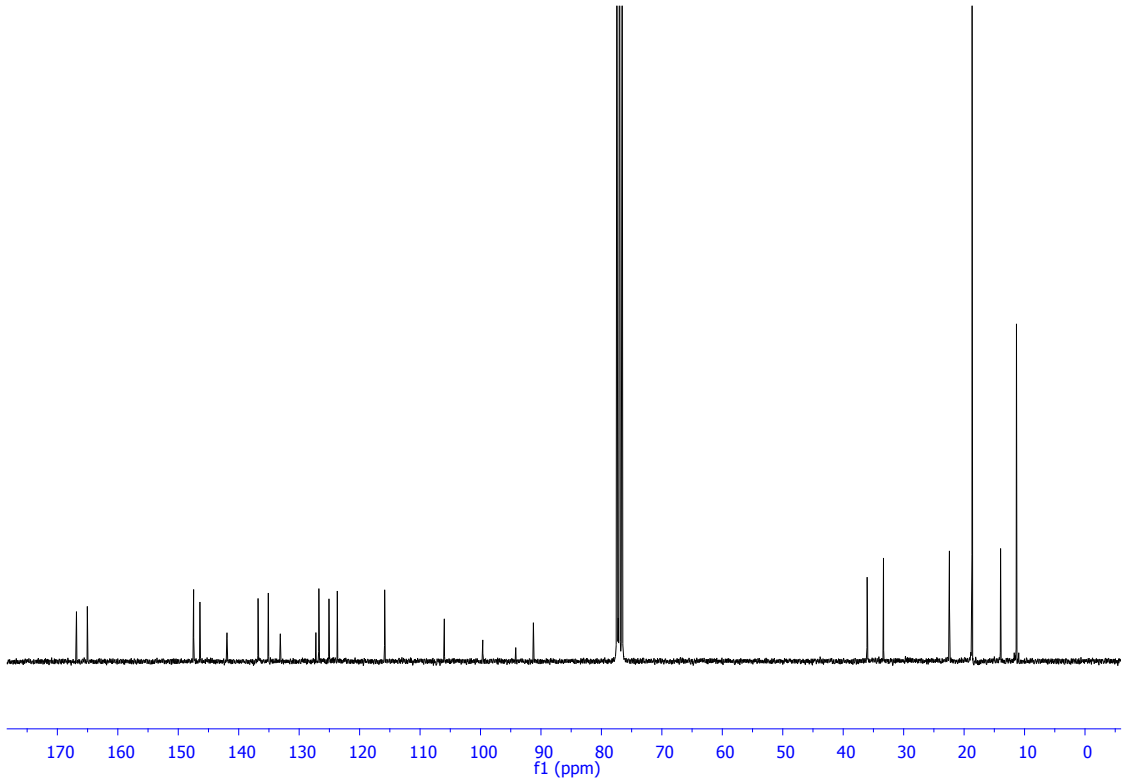
[3] R. Muñoz-Rodriguez, E. Buñuel, J. A. G. Williams, D. J. Cárdenas, *Chem. Comm.* **2012**, *48*, 5980-5982.

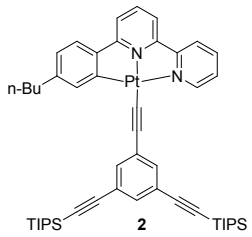
[4] F. Spaenig, J. H. Olivier, V. Prusakova, P. Retailleau, R. Ziessel, F. N. Castellano, *Inorg. Chem.* **2011**, *50*, 10859-10871.

[5] M. Juríček, M. Felici, P. Contreras-Carballada, J. Lauko, S. R. Bou, P. H. J. Kouwer, A. M. Brouwer, A. E. Rowan, *J. Mat. Chem.* **2011**, *21*, 2104-2111**.**

^{1}H NMR and ^{13}C NMR of new compounds






n-Bu
N
Pt
N
TIPS
TIPS

2

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8.5
8.0
7.5
7.0
f1 (ppm)
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
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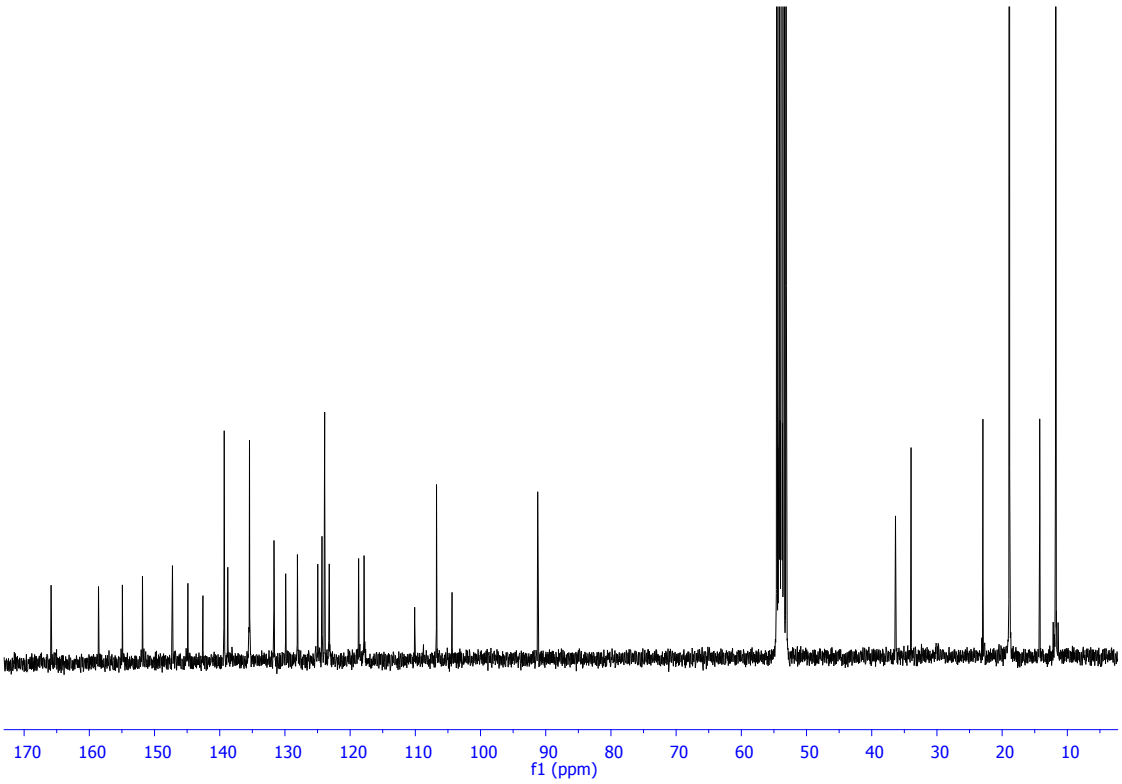
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)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20
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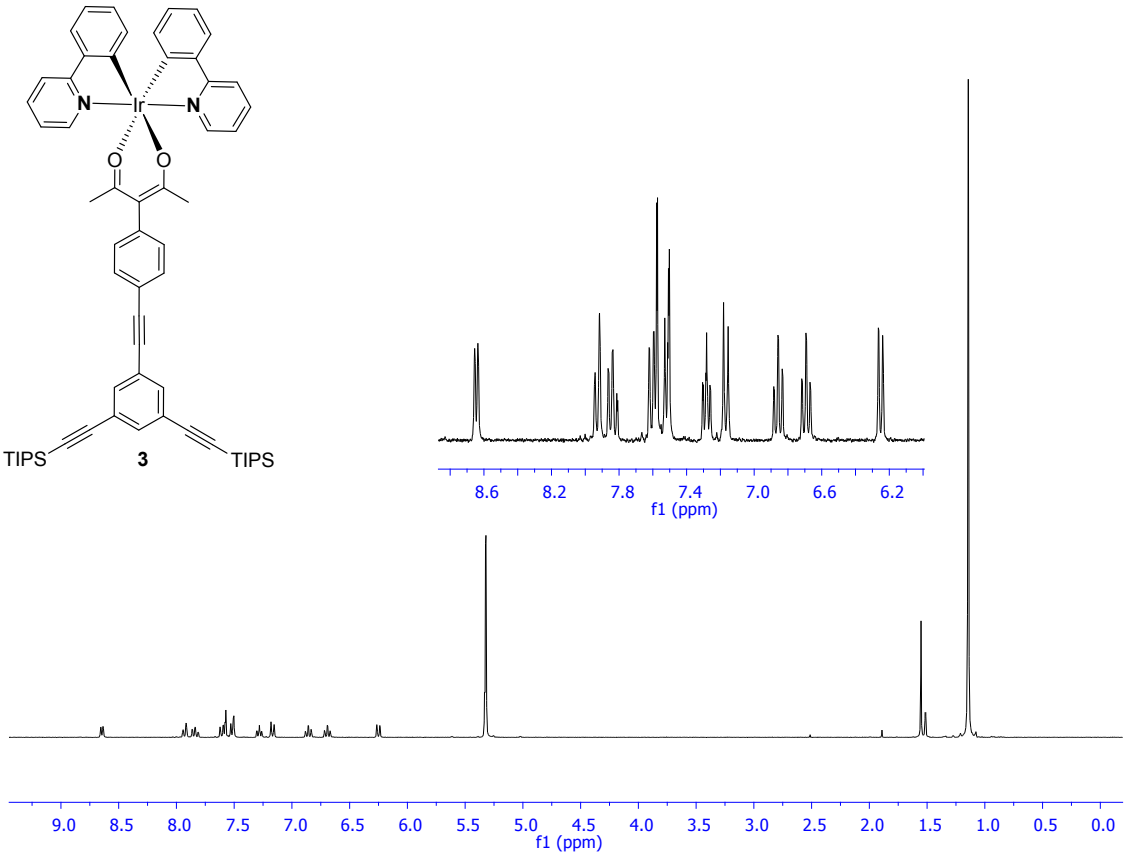
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O
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TIPS
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8.2
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6.2
f1 (ppm)
9.0
8.5
8.0
7.5
7.0
6.5
6.0
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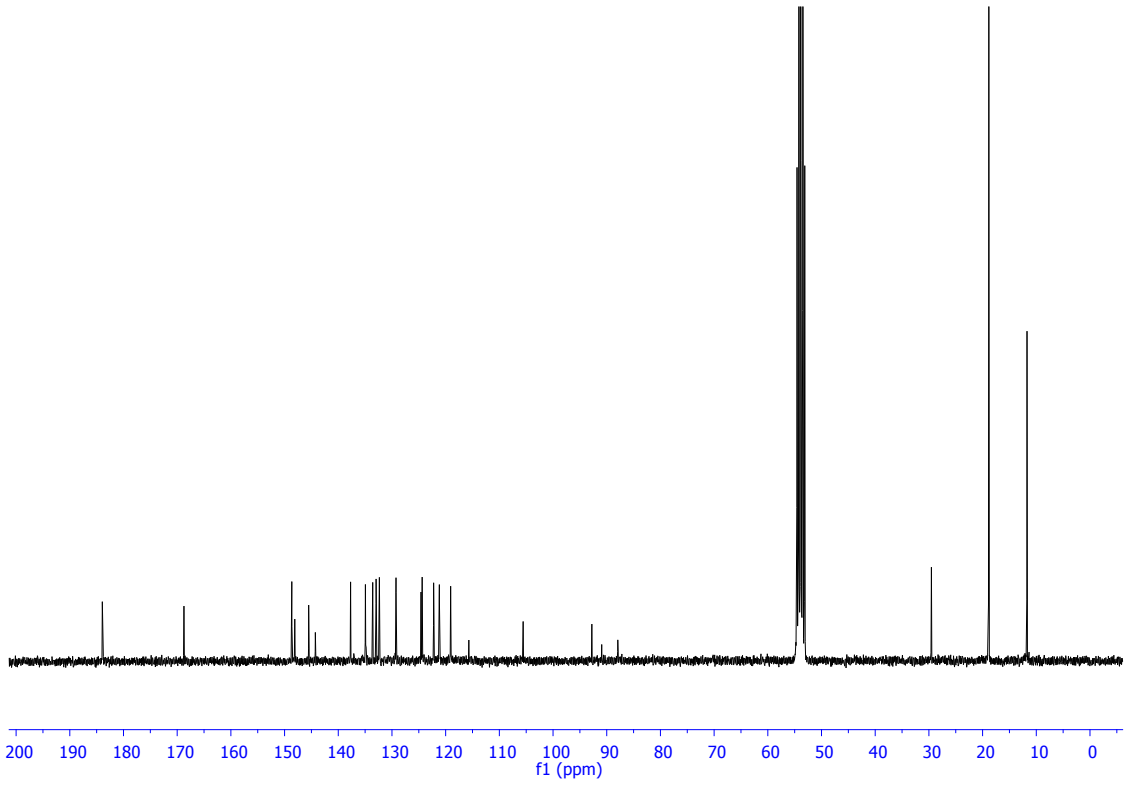
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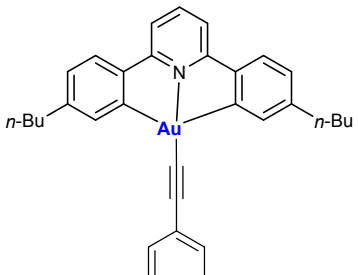
30
20
10
0
f1 (ppm)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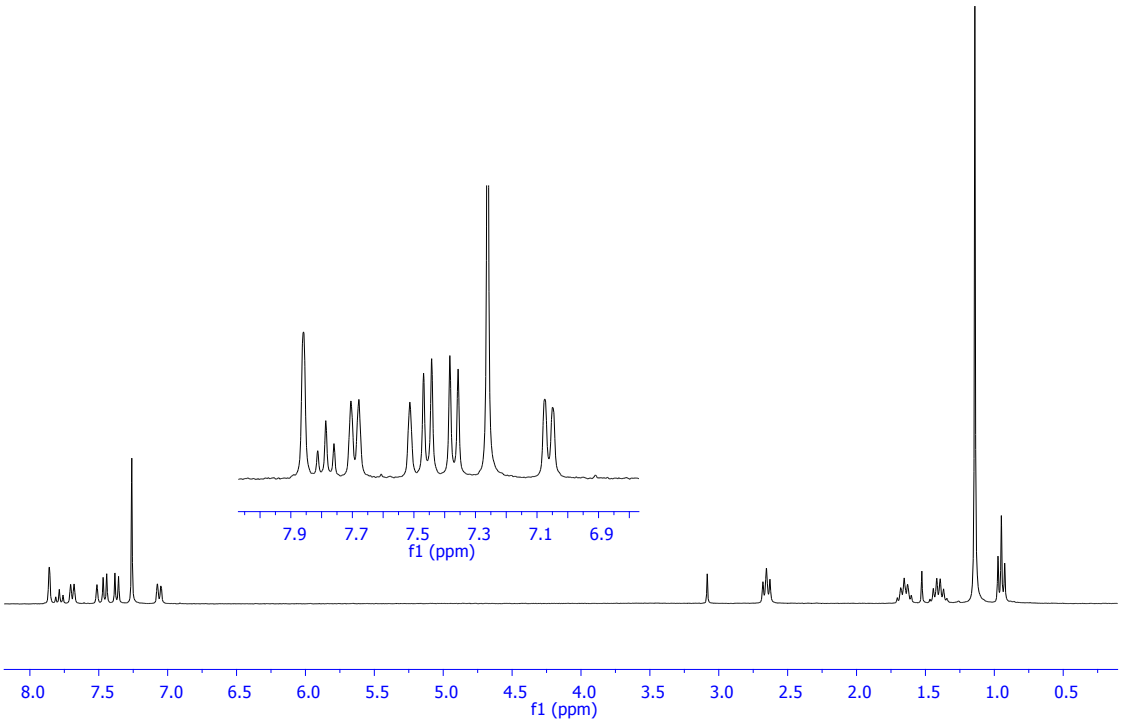
Au
n-Bu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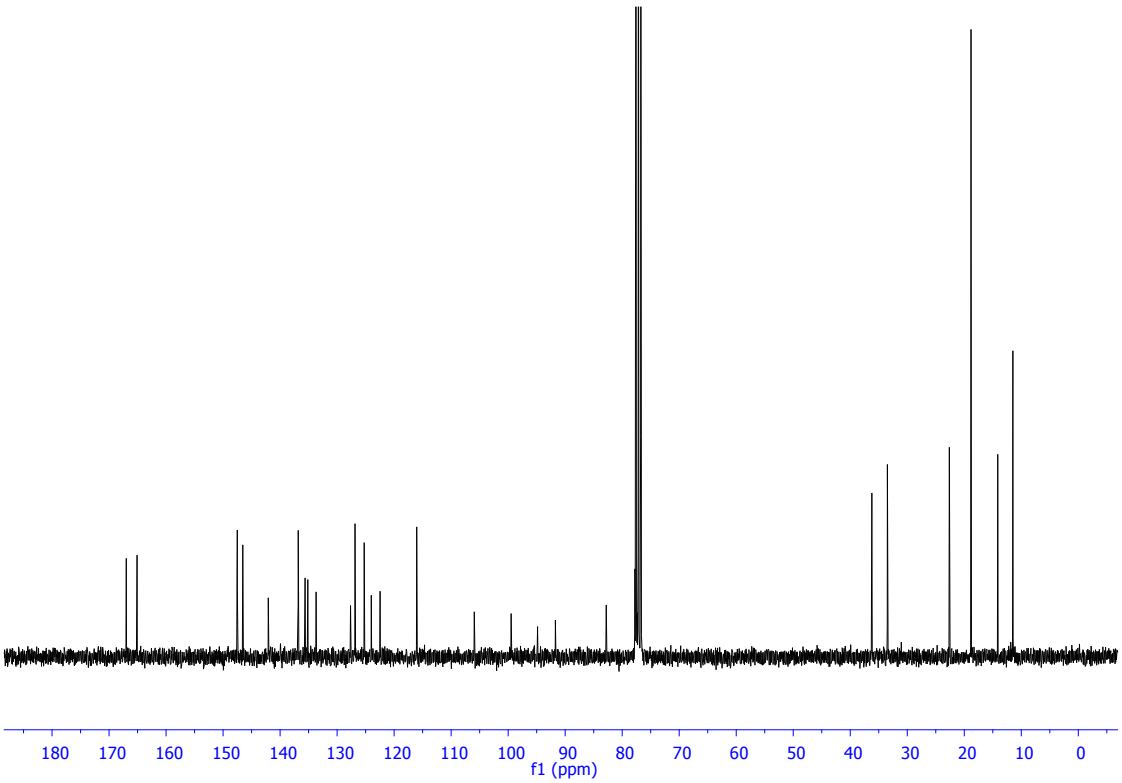
1.5
1.0
0.5
f1 (ppm)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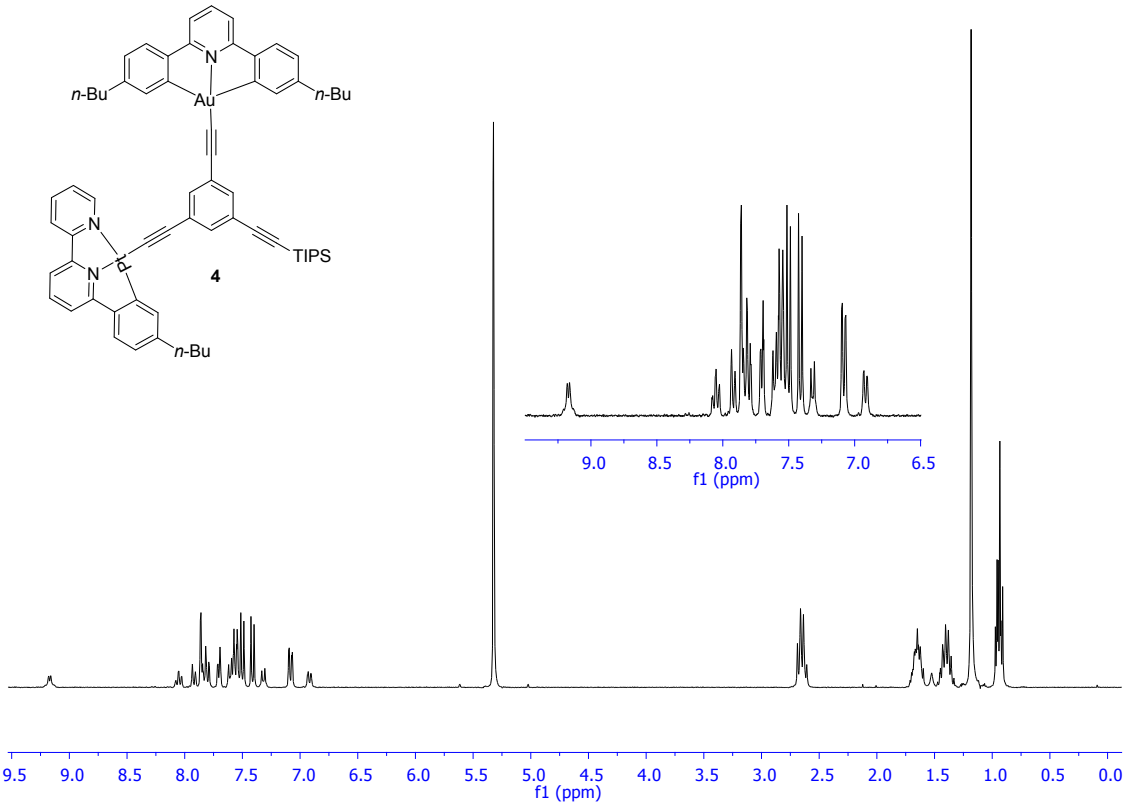
f1 (ppm)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Au
n-Bu
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N
TIPS
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n-Bu
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8.5
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6.5
6.0
5.5
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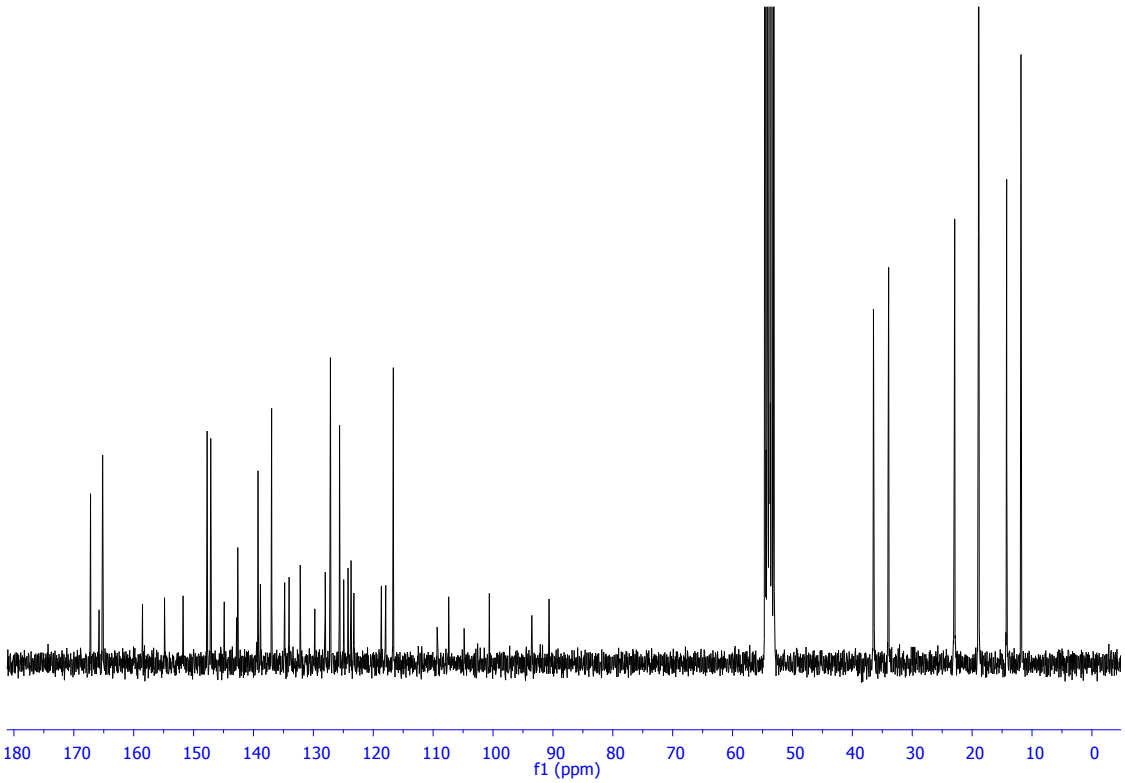
0.0
f1 (ppm)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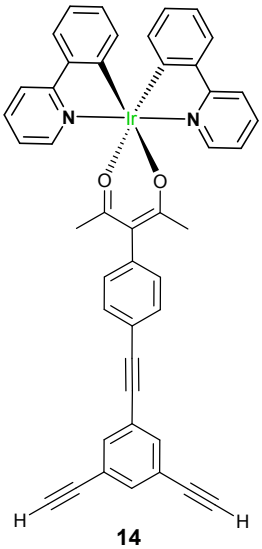
f1 (ppm)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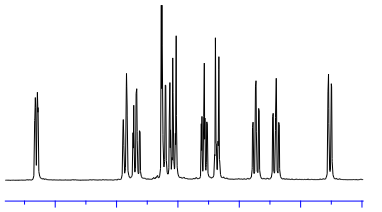
O
H
H

14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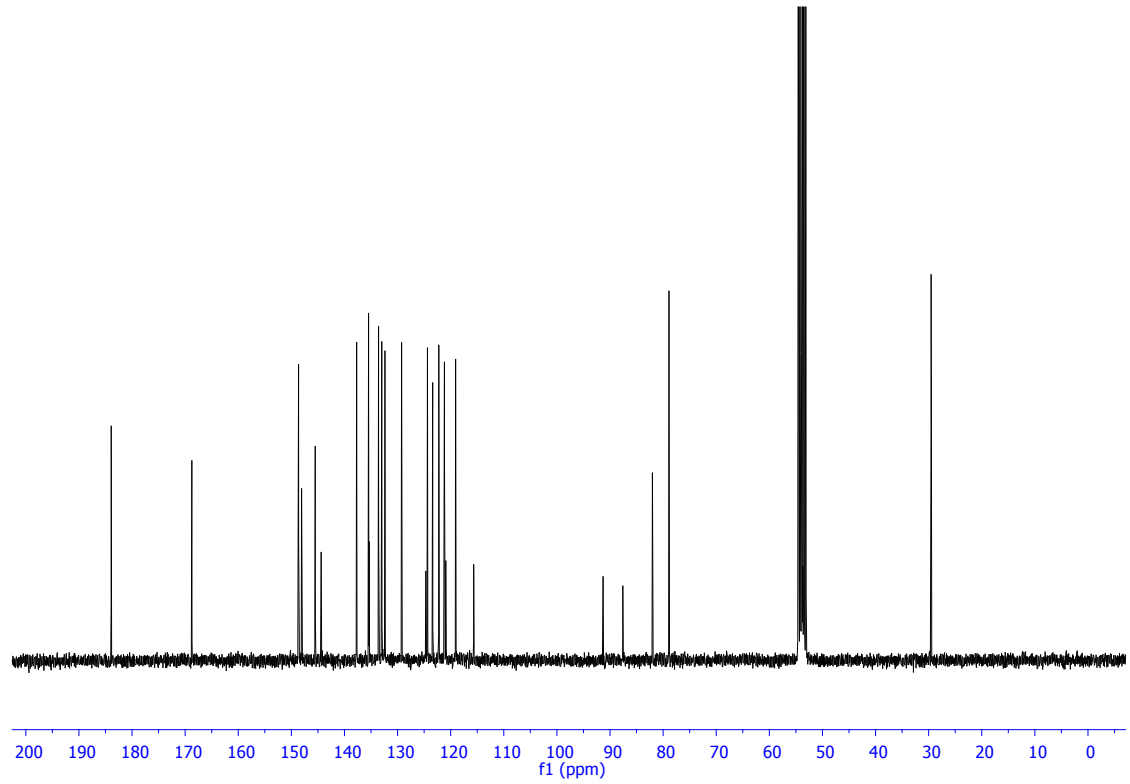
-0.5
f1 (ppm)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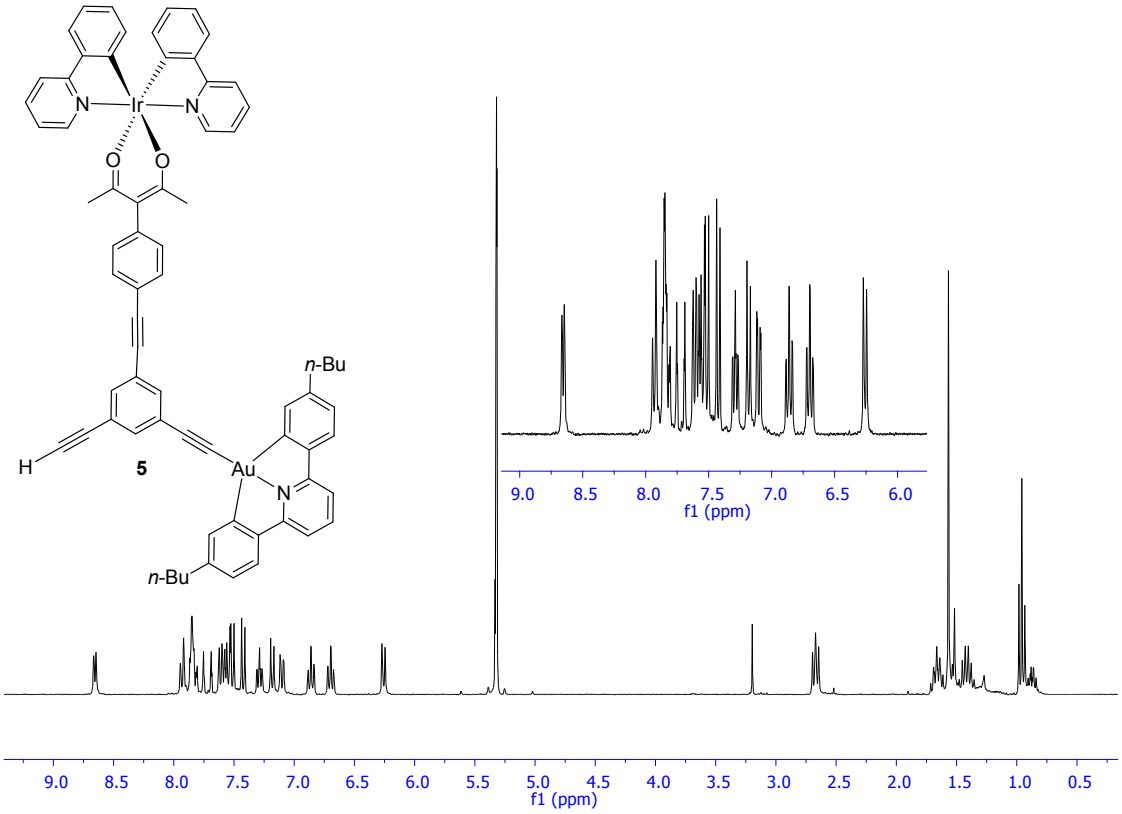
10
0
f1 (ppm)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H
5
Au
N
n-Bu
9.0 8.5 8.0 7.5 7.0 6.5 6.0
f1 (ppm)
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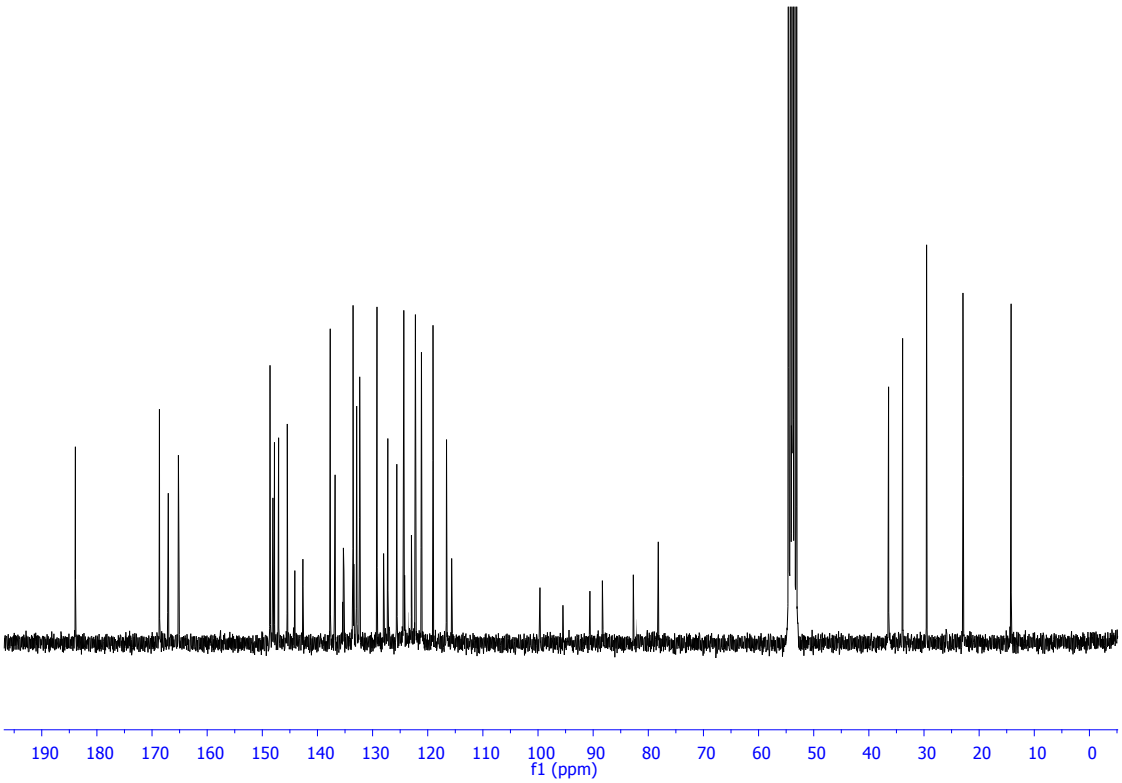
f1 (ppm)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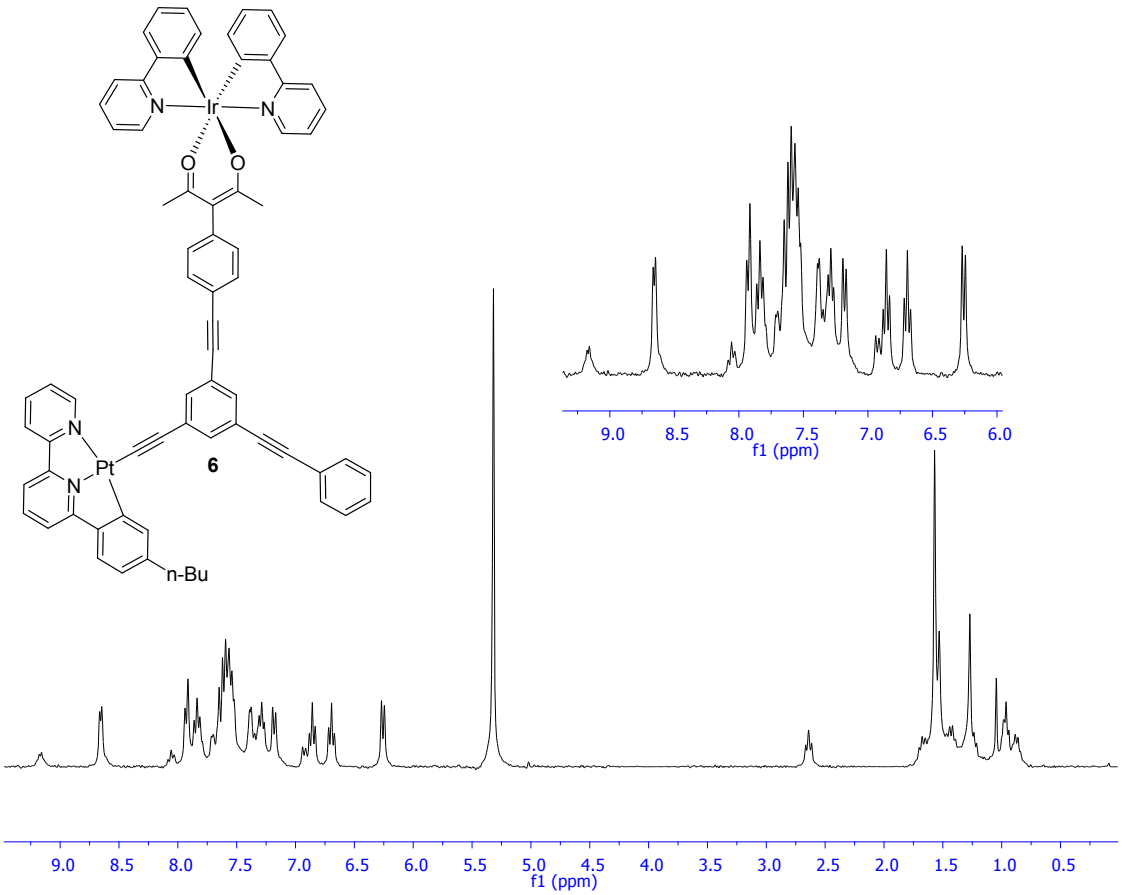
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Ir
N
O
O
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Pt
N
n-Bu
6
9.0 8.5 8.0 7.5 7.0 6.5 6.0
f1 (ppm)
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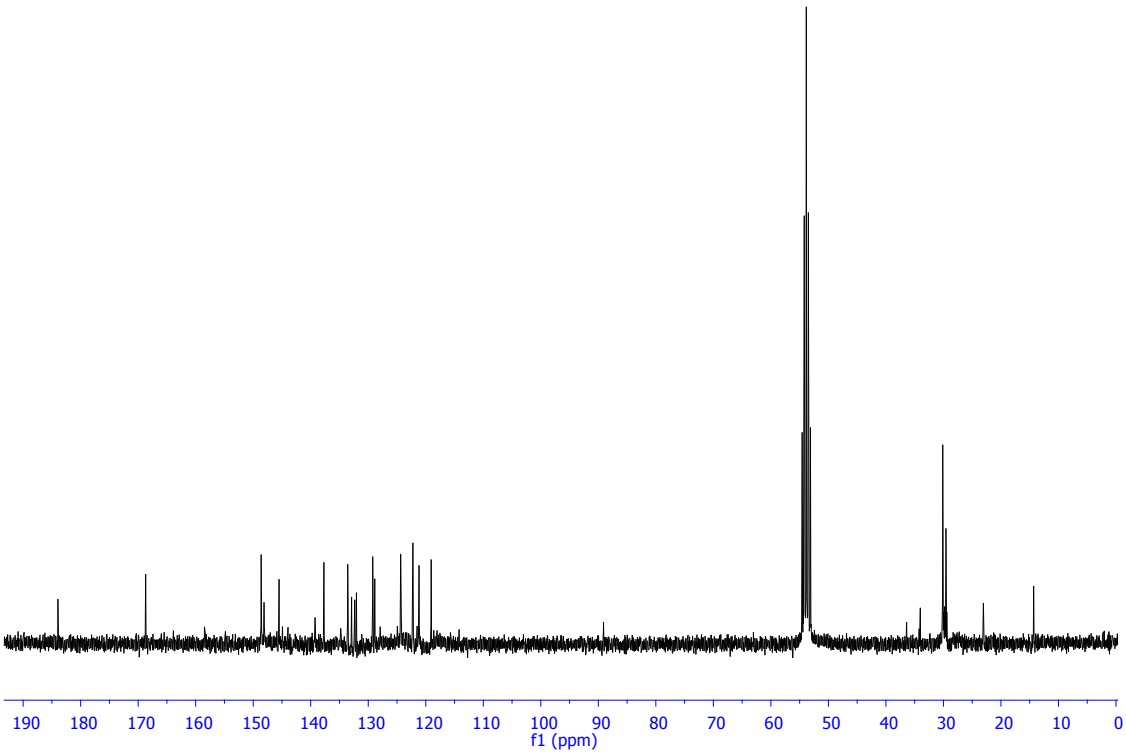
f1 (ppm)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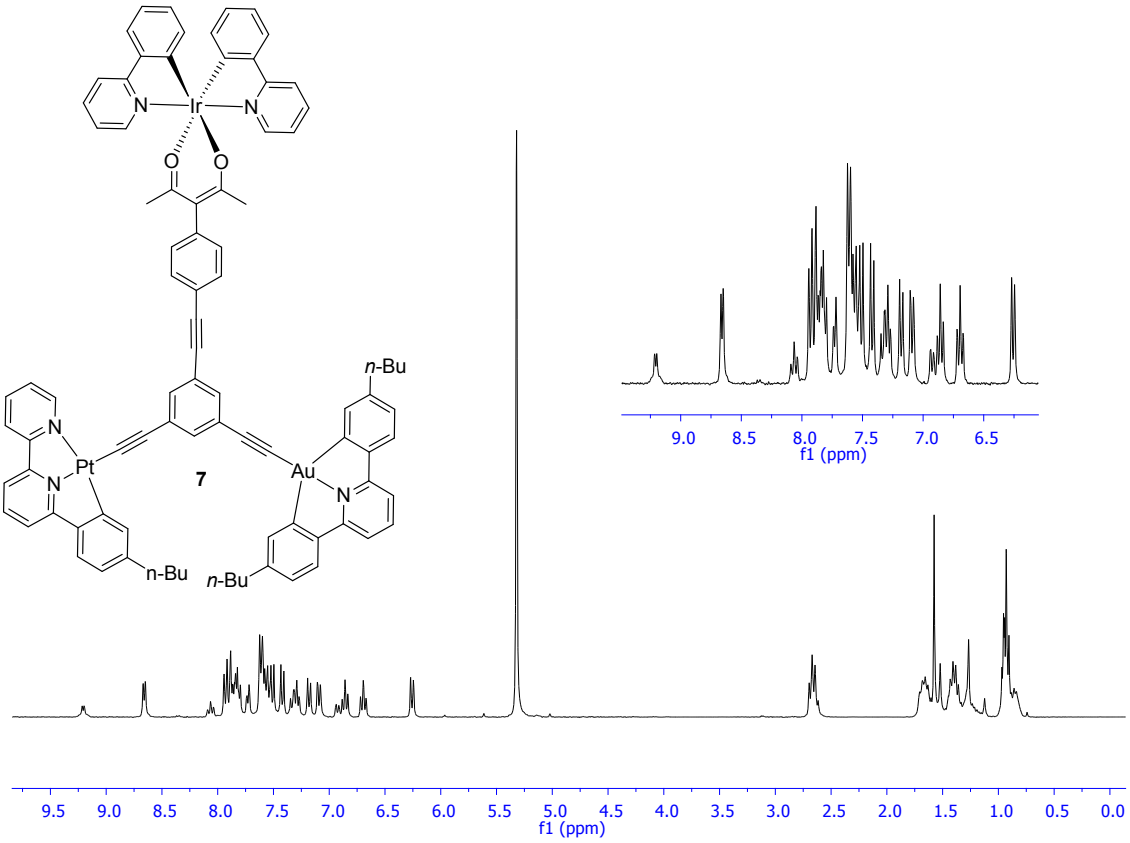
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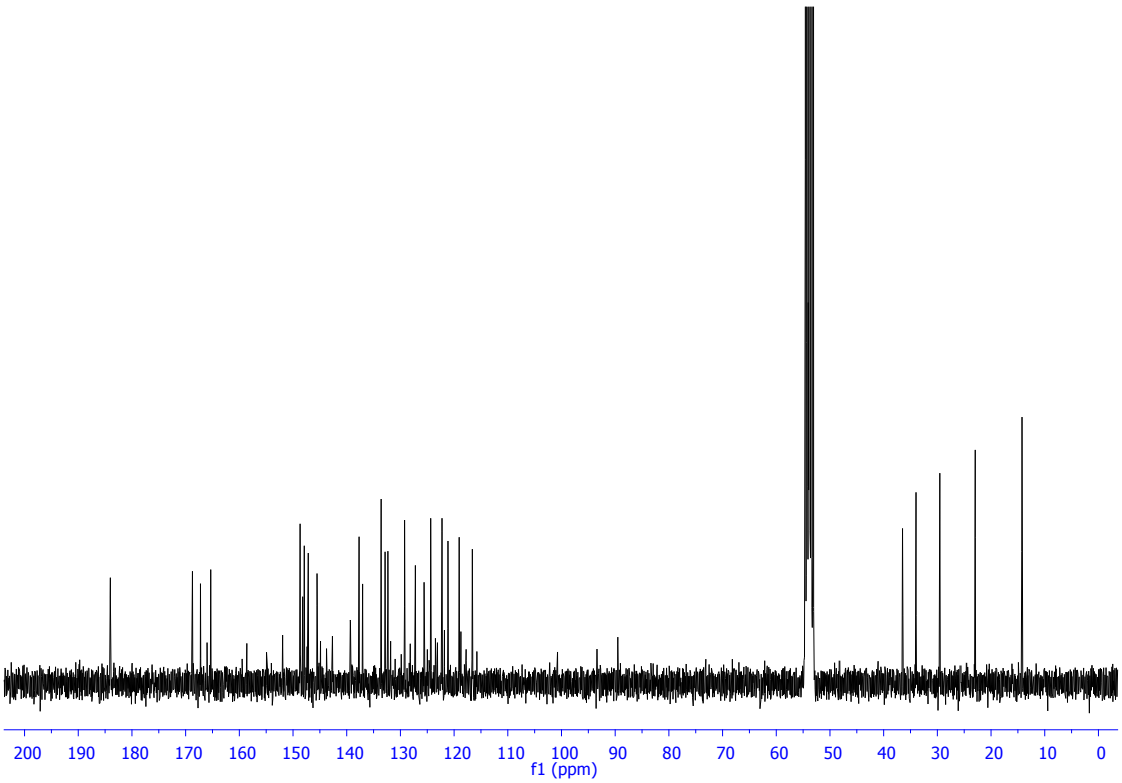
7
Au
N
n-Bu
n-Bu
9.0 8.5 8.0 7.5 7.0 6.5
f1 (ppm)
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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Additional absorption and emission spectra.

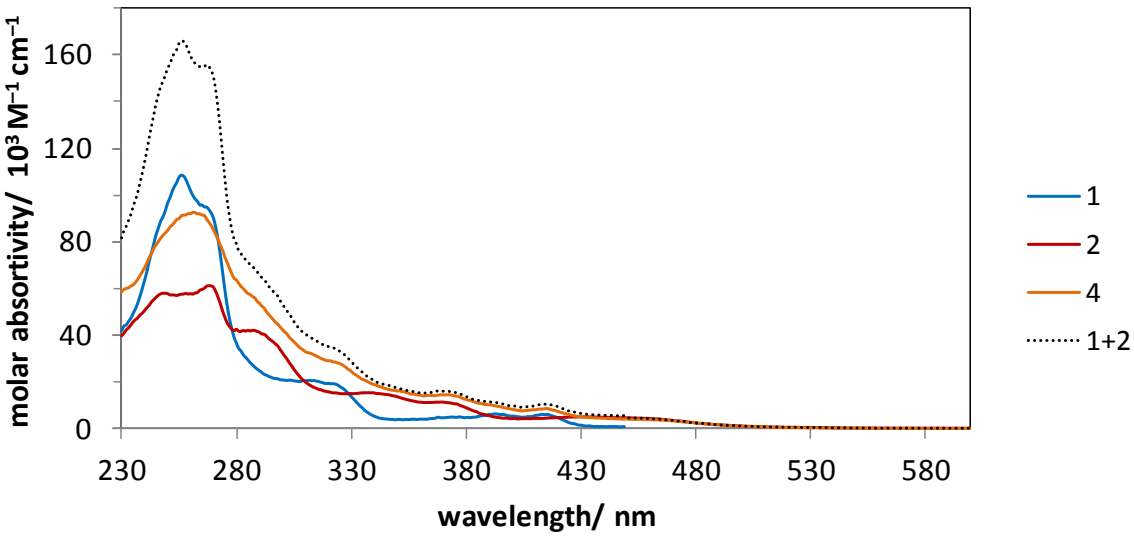

Fig. 1. *Absorption spectra of the homonuclear complexes* ***Au*** *(blue line) and* ***Pt****, and of the heterodimer* ***AuPt****, in* CH_2Cl_2 *at 298 K. The dotted line shows the sum of* ***Au****+****Pt****, highlighting the similarity to the spectrum of* ***AuPt****.*

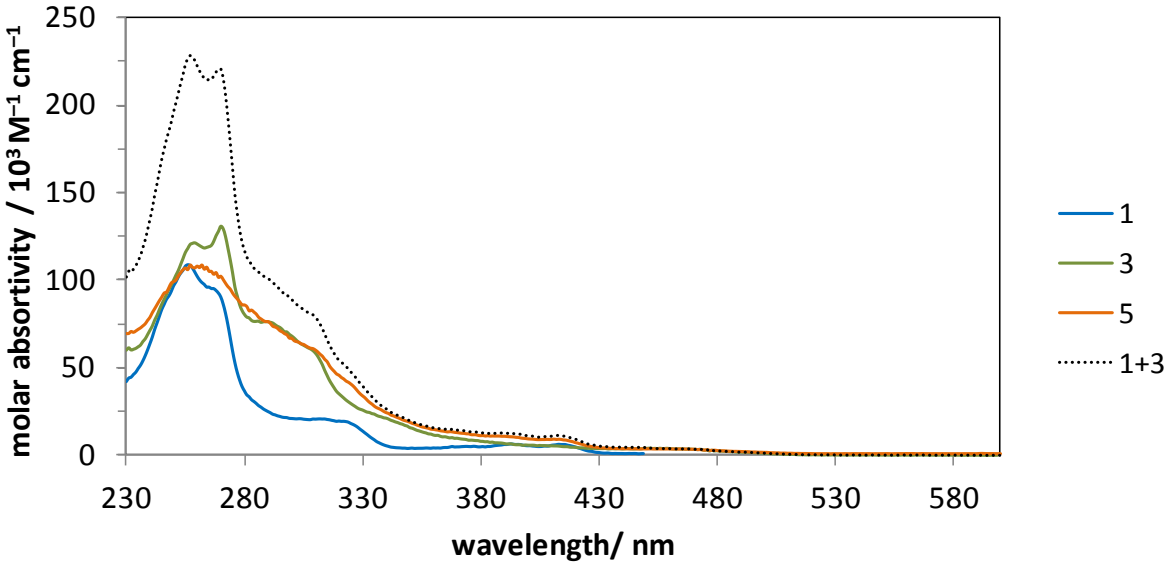

Fig. 2. *Absorption spectra of the homonuclear complexes* ***Au*** *(blue line) and* ***Ir****, and of the heterodimer* ***AuIr****, in* CH_2Cl_2 *at 298 K. The dotted line shows the sum of* ***Au****+****Ir****, highlighting the similarity to the spectrum of* ***AuIr****.*

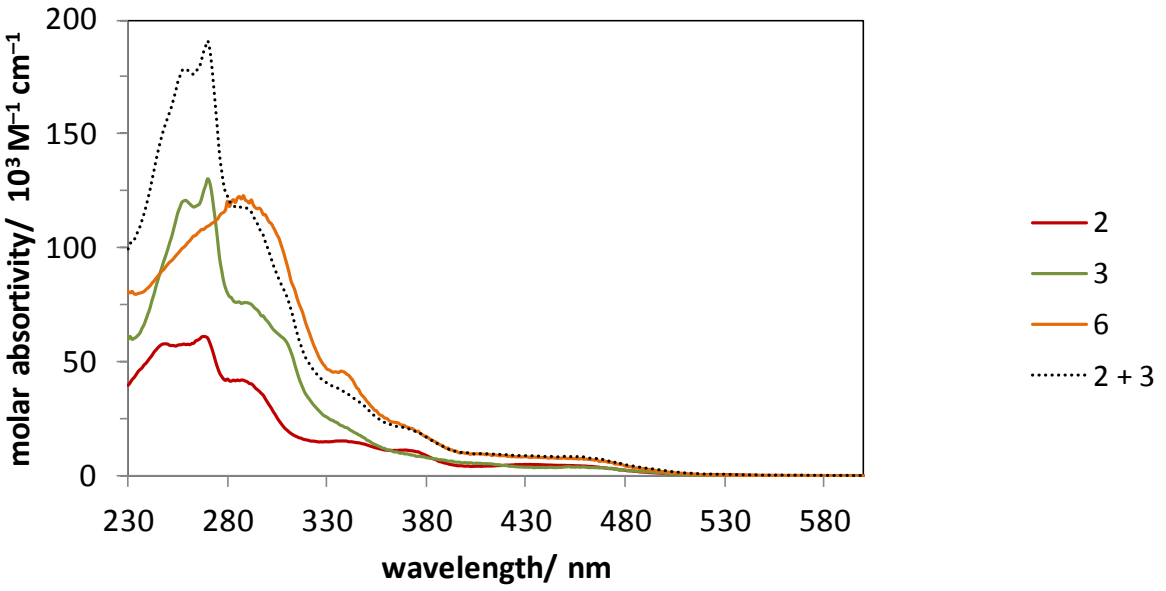

Fig. 3. *Absorption spectra of the homonuclear complexes* ***Pt*** *(red line) and* ***Ir****, and of the heterodimer* ***PtIr****, in CH_2Cl_2 at 298 K. The dotted line shows the sum of* ***Pt+Ir****, highlighting the similarity to the spectrum of* ***Pt+Ir****.*

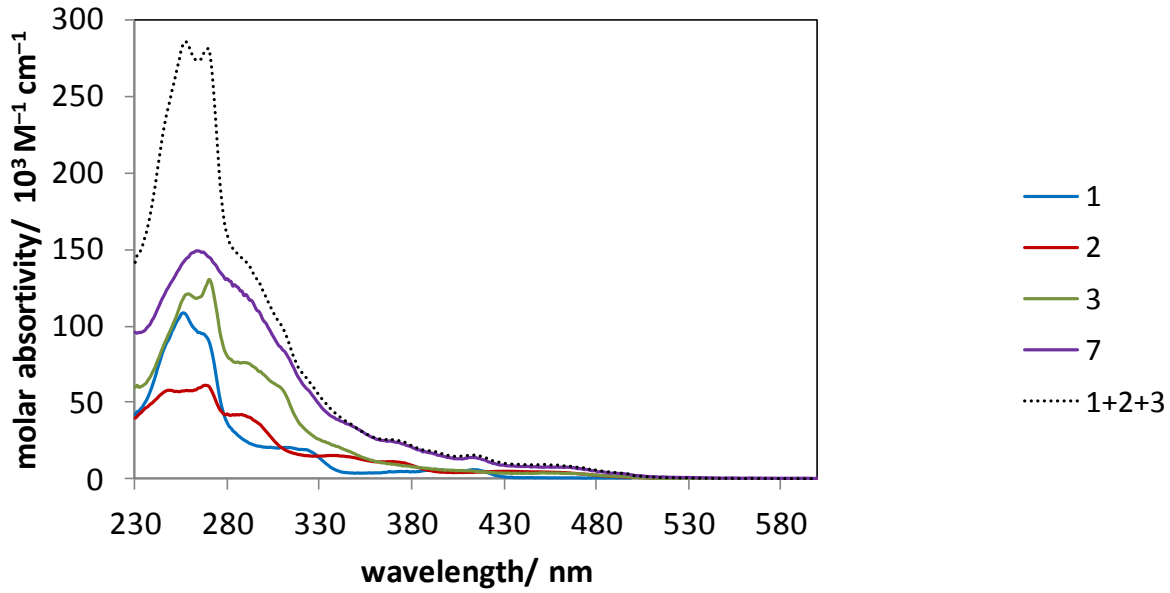

Fig. 4. *Absorption spectra of the homonuclear complexes* ***Au, Pt*** *and* ***Ir****, and of the trinuclear* ***AuPtIr****, in CH_2Cl_2 at 298 K. The dotted line shows the sum of* ***Au+Pt+Ir****.*

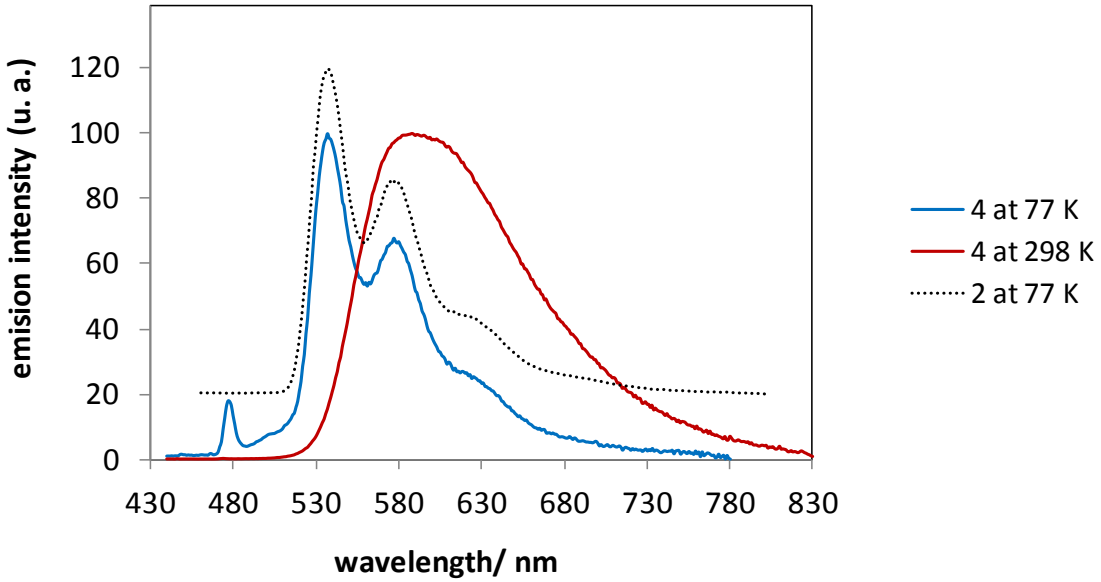

Fig. 5. *Comparison of the emission spectra of* ***AuPt*** *complex in CH_2Cl_2 at 298 K (red line) and at 77 K (in diethyl ether / isopentane / ethanol, 2:2:1 by volume; blue line). The dotted line shows the emission of* ***Pt*** *mononuclear complex at 77 k.*

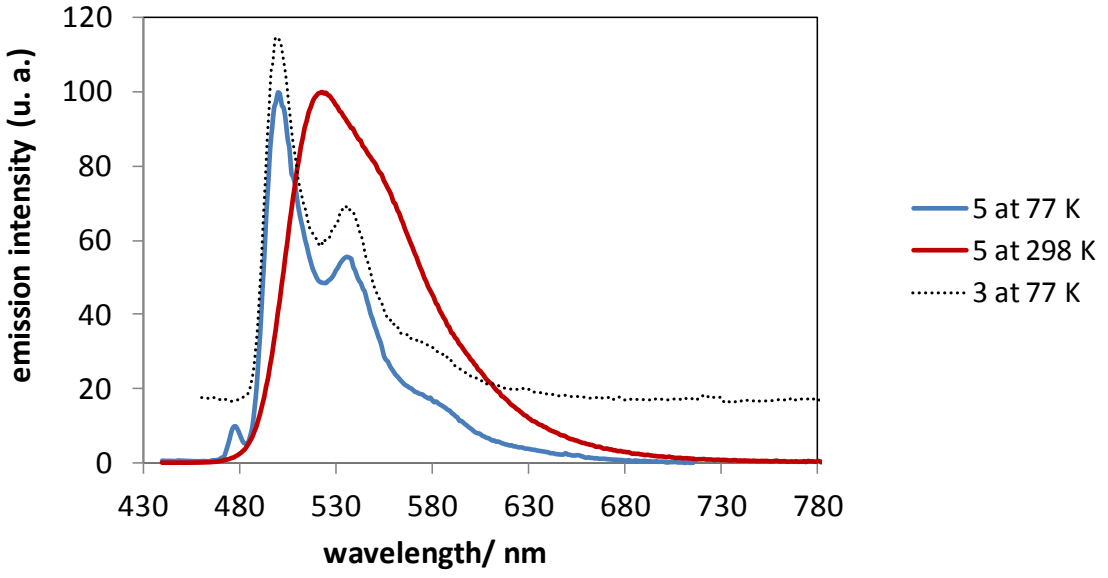

Fig. 6. *Comparison of the emission spectra of* ***AuIr*** *complex in CH_2Cl_2 at 298 K (red line) and at 77 K (in diethyl ether / isopentane / ethanol, 2:2:1 by volume; blue line). The dotted line shows the emission of* ***Ir*** *mononuclear complex at 77 k.*

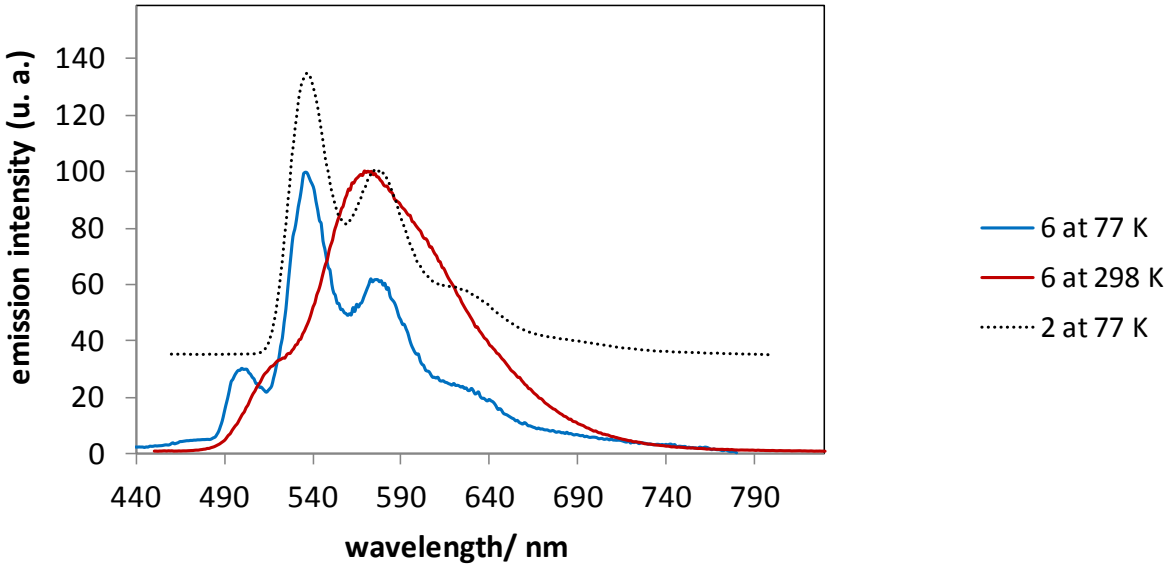

Fig. 7. *Comparison of the emission spectra of* ***IrPt*** *complex in* CH_2Cl_2 *at 298 K (red line) and at 77 K (in diethyl ether / isopentane / ethanol, 2:2:1 by volume; blue line). The dotted line shows the emission of* ***Pt*** *mononuclear complex at 77 k.*