

Supporting Information for:

Electrochemically tuneable multi-colour electrochemiluminescence from a single emitter

Mohammad A. Haghighatbin,[†] Shih-Chun Lo,[‡] Paul L. Burn[‡] and Conor F. Hogan^{*,†}

[†] Department of Chemistry and Physics, La Trobe Institute for Molecular Sciences, La Trobe University, Victoria, 3086, Australia

[‡] Centre for Organic Photonics & Electronics (COPE), The University of Queensland, School of Chemistry and Molecular Biosciences, Brisbane, Queensland, 4072, Australia

*To whom correspondence should be addressed. E-mail: c.hogan@latrobe.edu.au

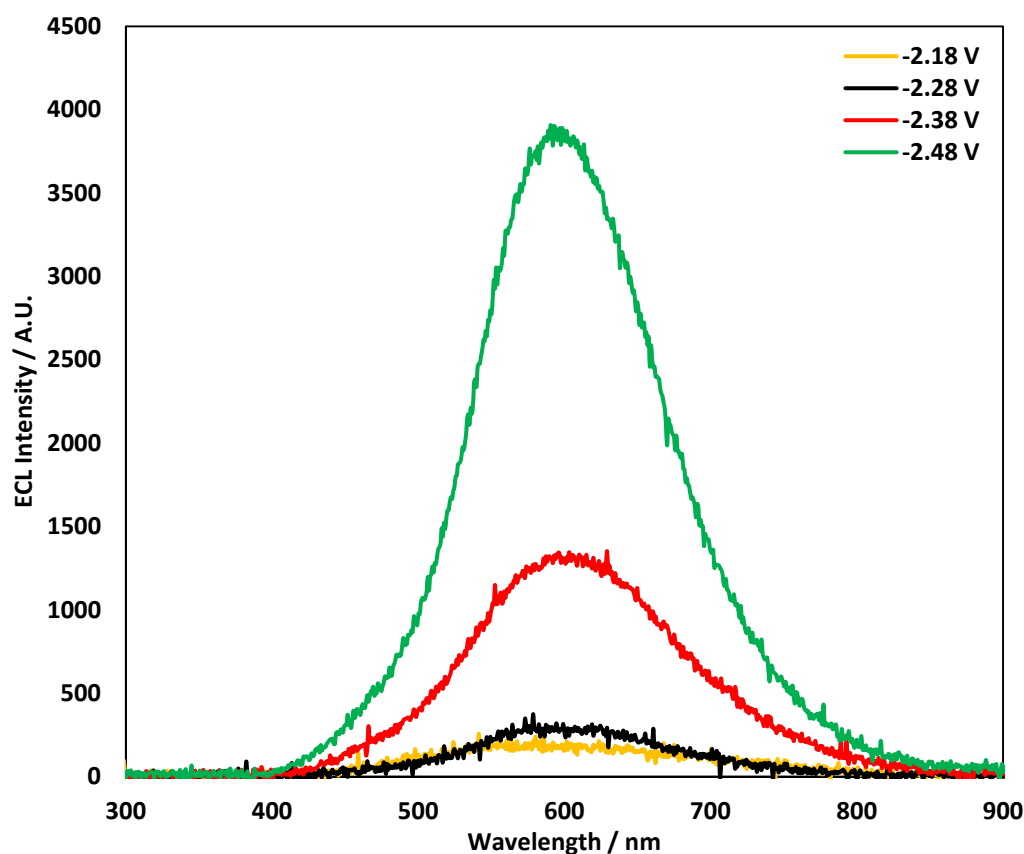


Figure S1. Red shifted annihilation ECL emission observed when cathodic potential limit was set to a value less negative than the first reduction potential of the complex. ECL spectra for (0.5 mM) solution of $\text{Ir}(\text{mptz})_3$ and TBAPF_6 (0.1 M) in acetonitrile collected using a CCD detector (integration time: 6 s) and 12 cycles of two-step potential chronoamperometry with a 0.25 s pulse width between 0.49 V *versus* Fc^+/Fc and reductive potentials in the range of -2.18 V to -2.48 V *versus* Fc^+/Fc .

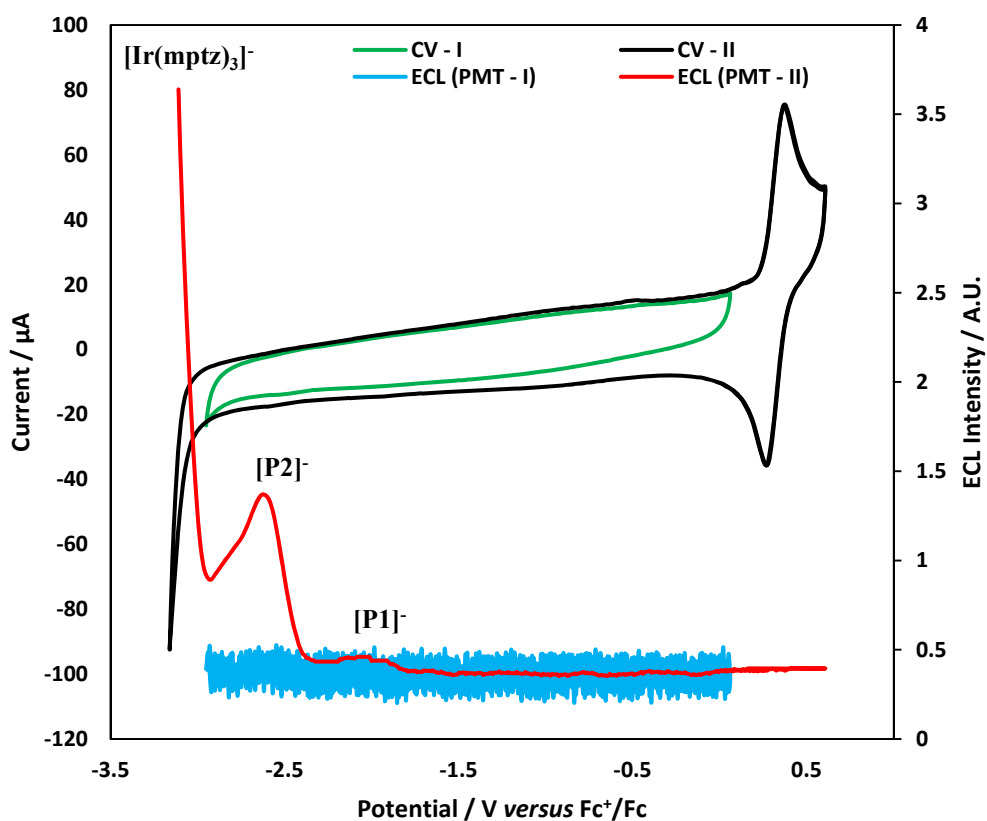


Figure S2. Cyclic voltammograms (CVs) of Ir(mptz)_3 (0.5 mM) in a solution of acetonitrile containing 0.1 M TBAPF_6 as supporting electrolyte and scan rate of 0.1 Vs^{-1} overlaid with ECL (PMT output) signal in the range of 0.6 V and -3.2 V *versus* Fc^+/Fc at the scan rate of 0.1 Vs^{-1} . The red and black traces are the same data as shown in Figure 2b in the main text but with negative going scan omitted for clarity. The green and blue traces represent the control experiment, scanned at lower redox potentials (*i.e.*, 0.0 V to -3.0 V *versus* Fc^+/Fc).

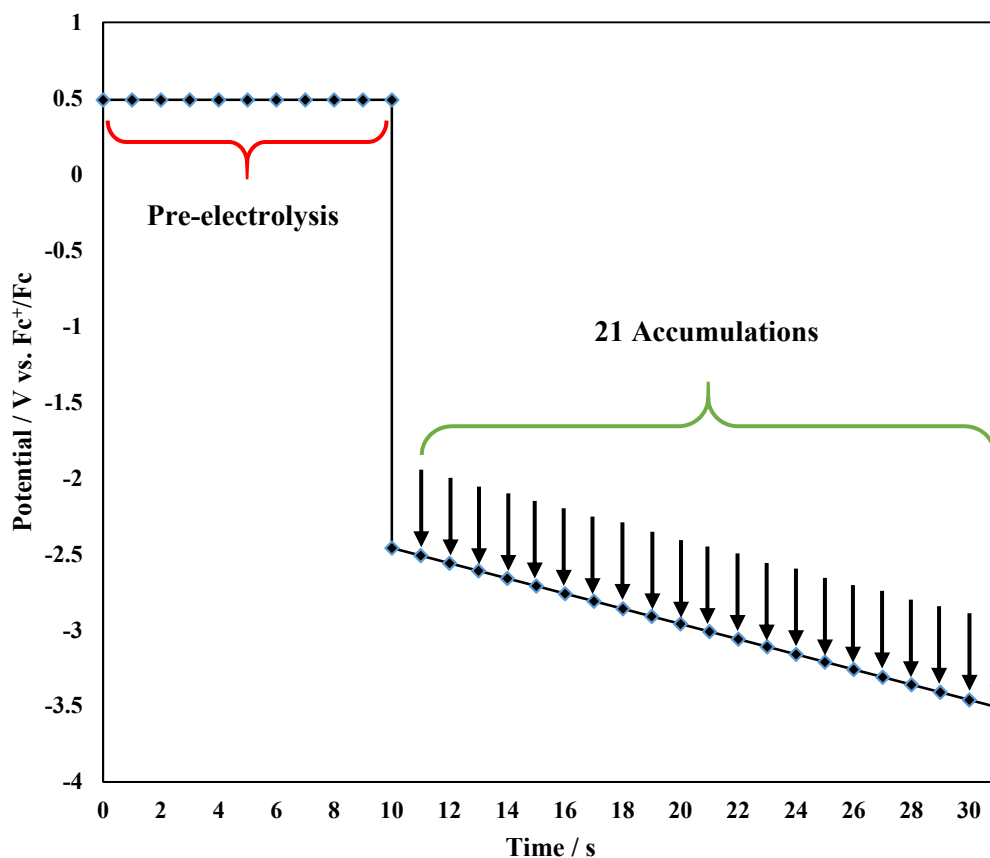
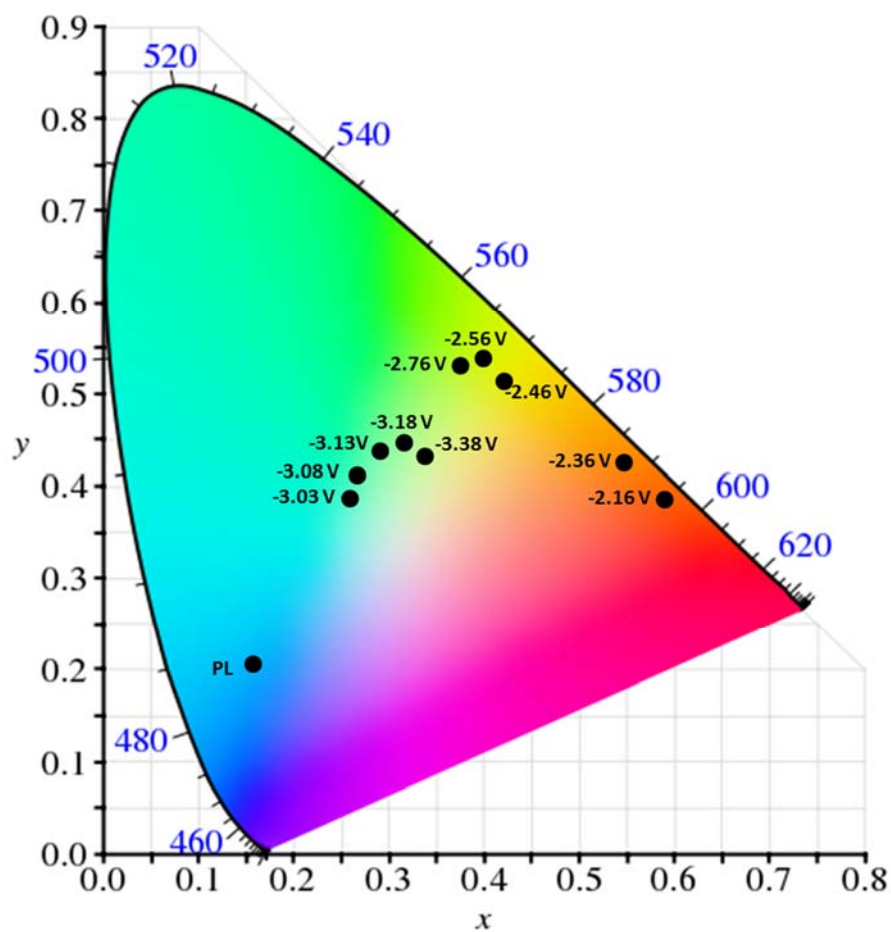


Figure S3. Excitation signal diagram for generating 3D-ECL plot (Figure 3a). The solution pre-electrolyzed at 0.49 V *versus* Fc⁺/Fc for 10 s following with a cathodic sweep from -2.46 to -3.51 V *versus* Fc⁺/Fc with a scan rate of 0.05 Vs⁻¹. A CCD detector captured 21 consecutive accumulations with an integration time of 1s to form the initial 3D-matrix file.



Potential / V versus Fc^+/Fc	CIE (x, y)
-2.16	(0.59, 0.39)
-2.36	(0.55, 0.43)
-2.46	(0.42, 0.51)
-2.56	(0.40, 0.54)
-2.76	(0.38, 0.53)
-3.03	(0.26, 0.39)
-3.08	(0.27, 0.41)
-3.13	(0.29, 0.44)
-3.18	(0.32, 0.45)
-3.38	(0.35, 0.43)

Figure S4. CIE 1931 (2-degree observer) chromaticity diagram for the ECL obtained with pulsing between 0.49 V *versus* Fc^+/Fc and a range of reduction potentials (shown on the diagram and the table above).

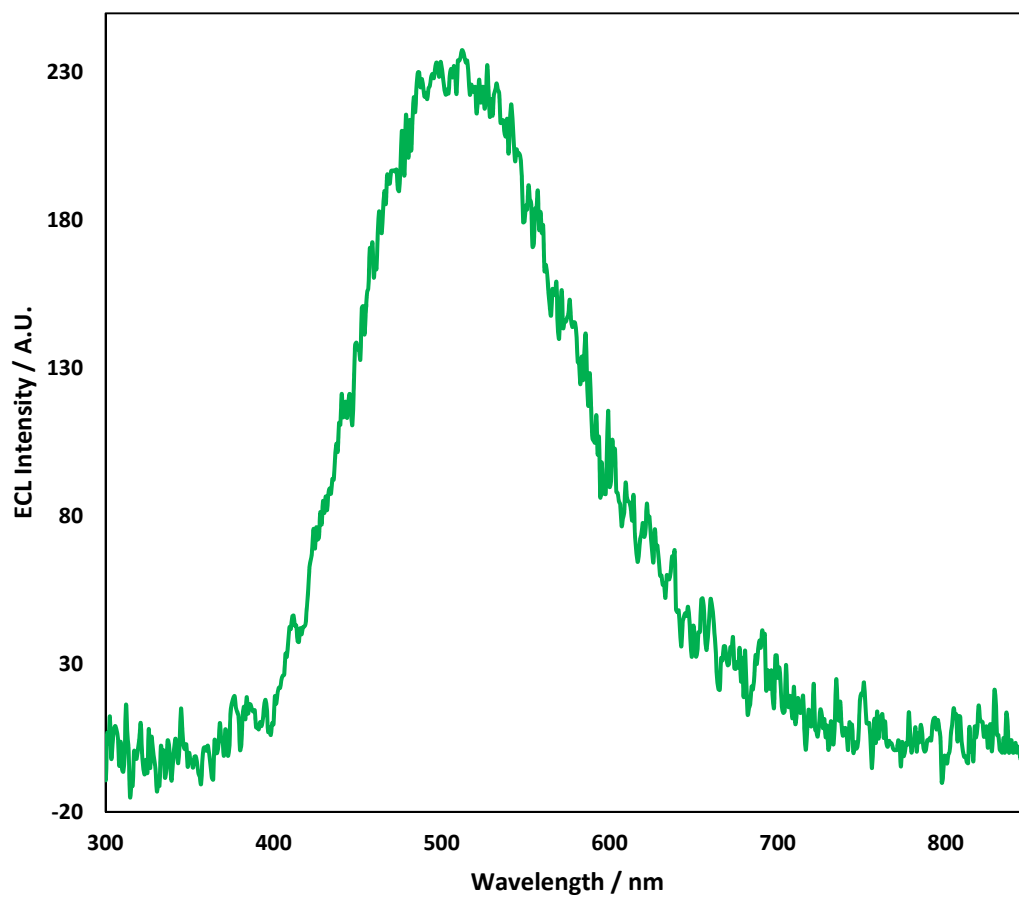


Figure S5. Near-white ECL spectrum obtained for (0.5 mM) solution of Ir(mptz)_3 and TBAPF_6 (0.1 M) in acetonitrile with pulsing the potential between 0.49 V and -3.38 V *versus* Fc^+/Fc .

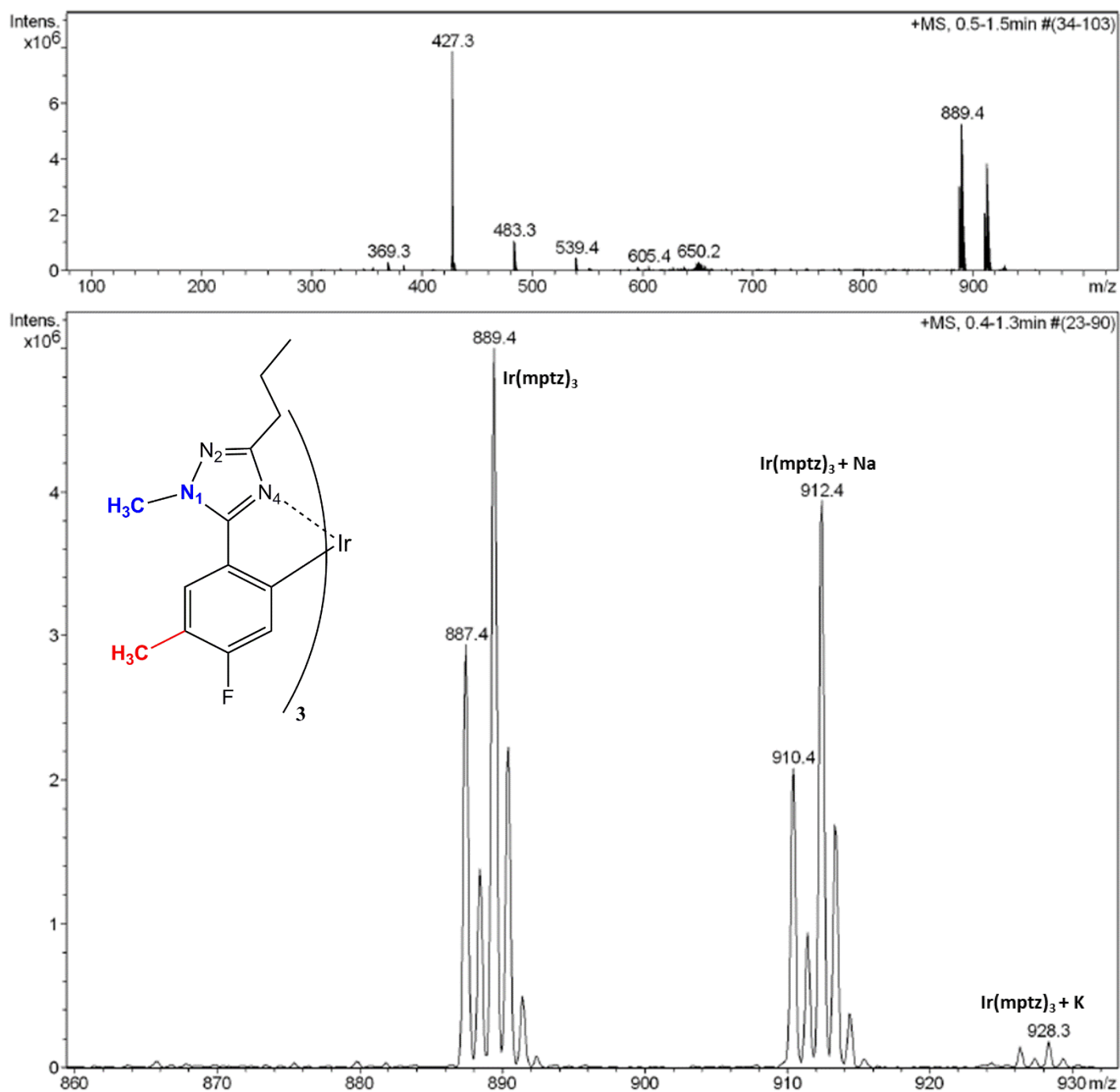


Figure S6a MS of Complex before electrochemical oxidation

Figure S6a. ESI-mass spectrum of Ir(mptz)₃ prior to electrochemical oxidation. The peaks at (*m/z*: 889.4, 912.4 and 928.3) are corresponded to the Ir(mptz)₃ complex and its sodium and potassium adducts, respectively.

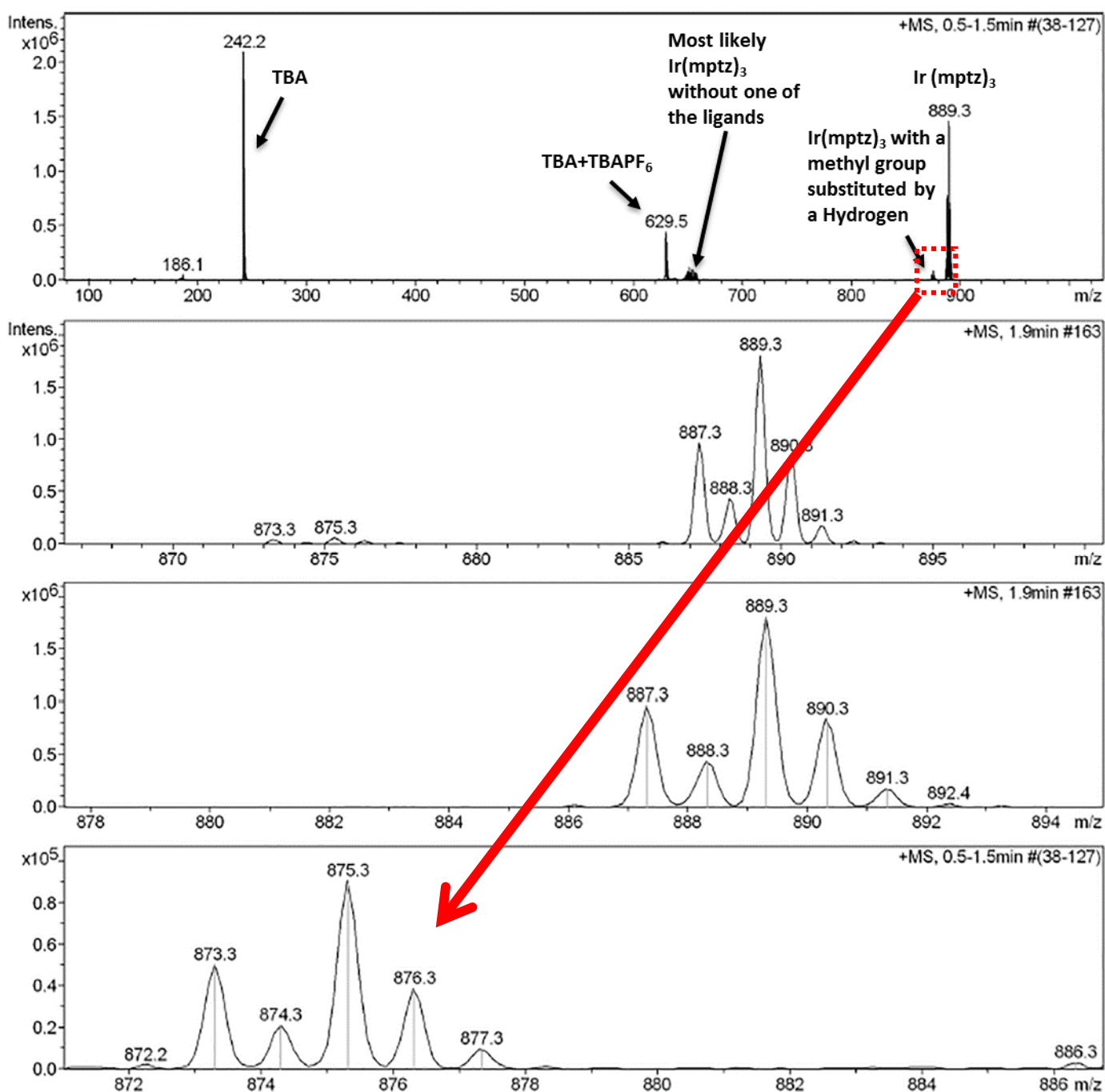


Figure S6b MS of Complex after electrochemical oxidation

Figure S6b. ESI-mass spectrum of Ir(mptz)₃ after performing bulk-electrolysis for 10 minutes 100 mV past the oxidation potential peak (E_{ox}). The peak at (m/z : 875) is most likely corresponded to the product with a demethylated nitrogen (N1) on the triazole ring followed by a further protonation.