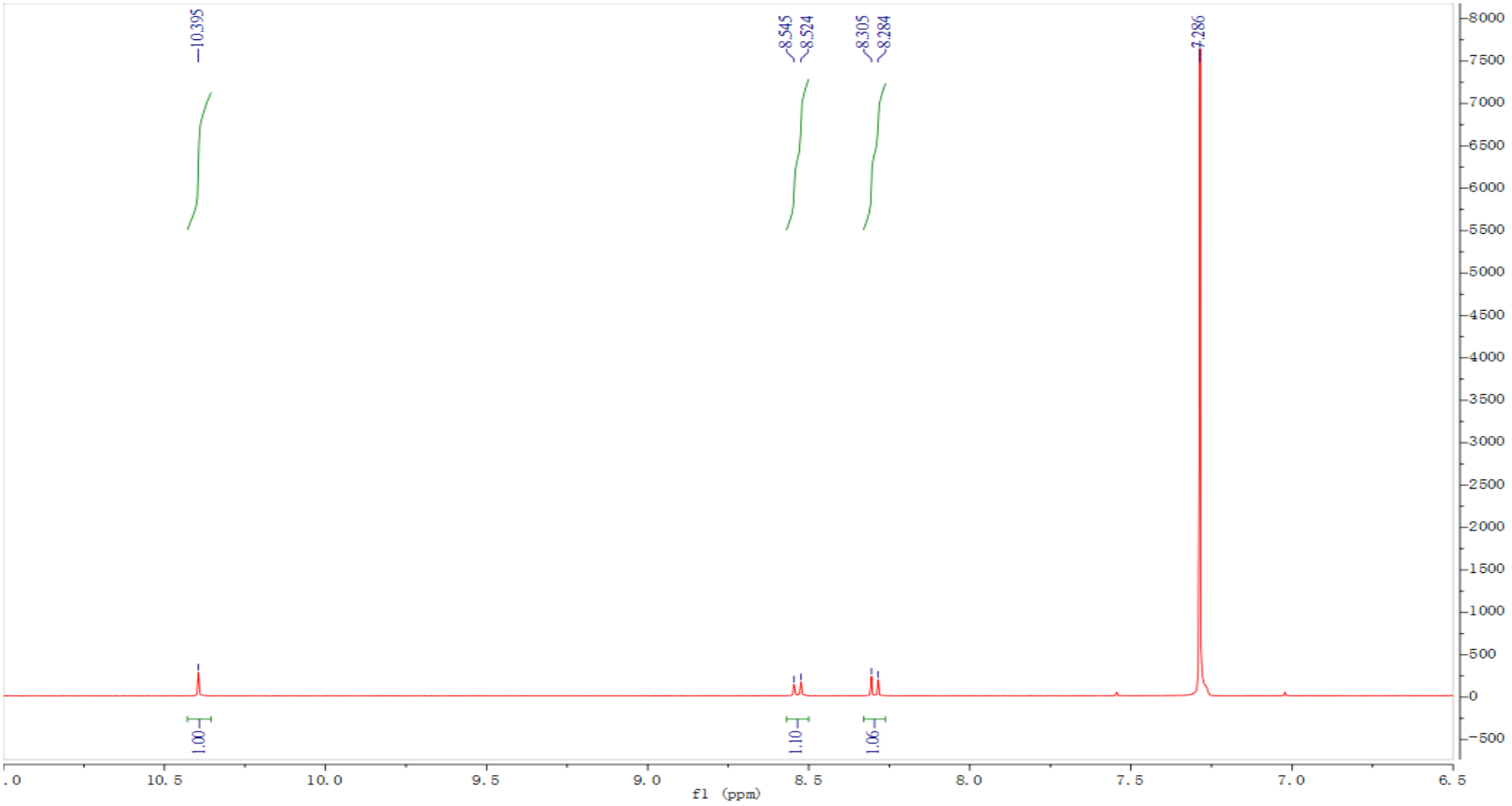

Figure S 1. ^{1}H NMR spectrum for 1,8-naphthyridine-2,7-dicarbaldehyde (in $CDCl_3$).

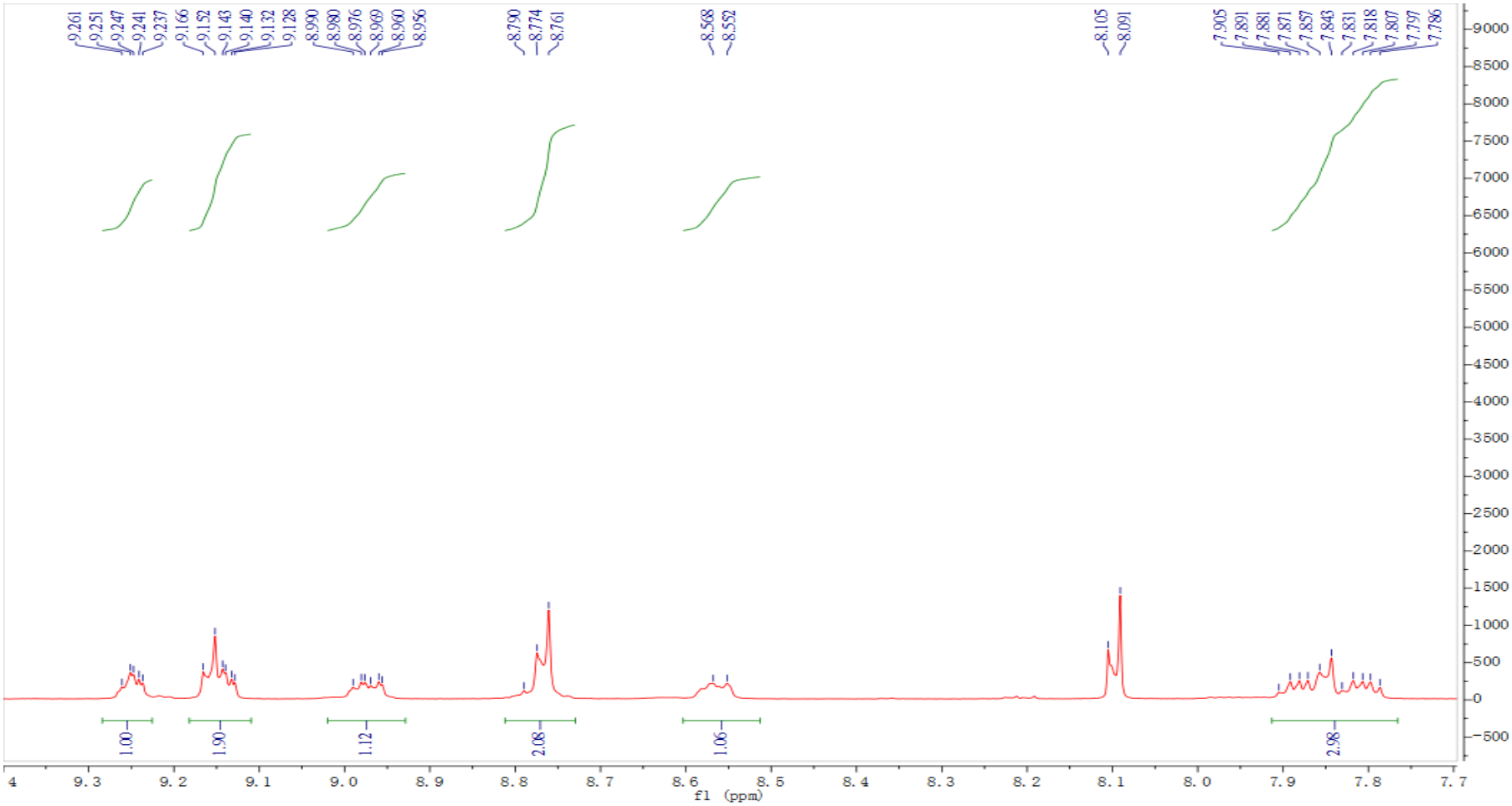

Figure S 2. ^{1}H NMR spectrum for L (in DMSO-d^{6} and a small amount of $CDCl_3$).

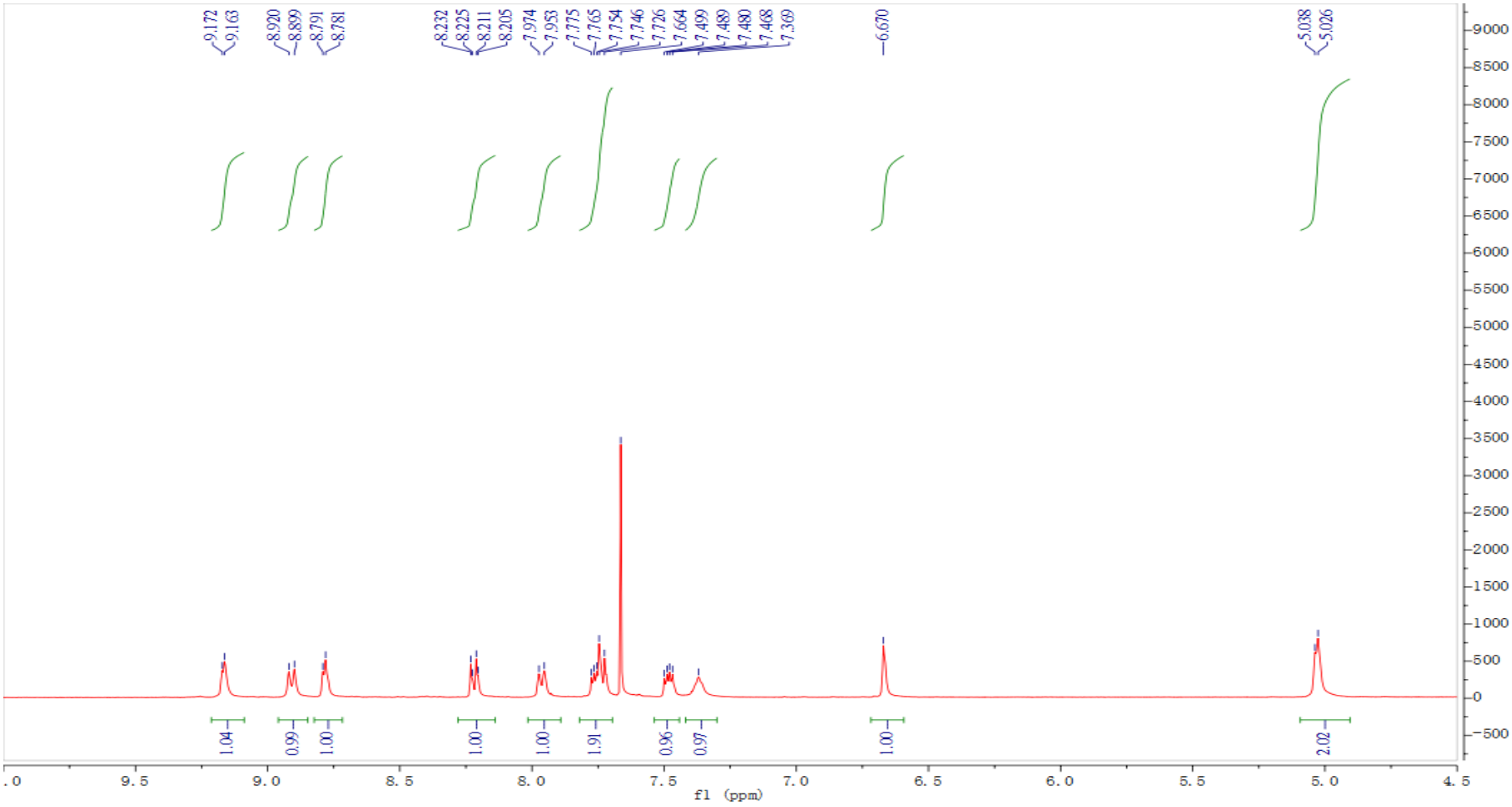

Figure S 3. ^{1}H NMR spectrum for H_2L (in DMSO-d^6 and a small amount of $CDCl_3$).

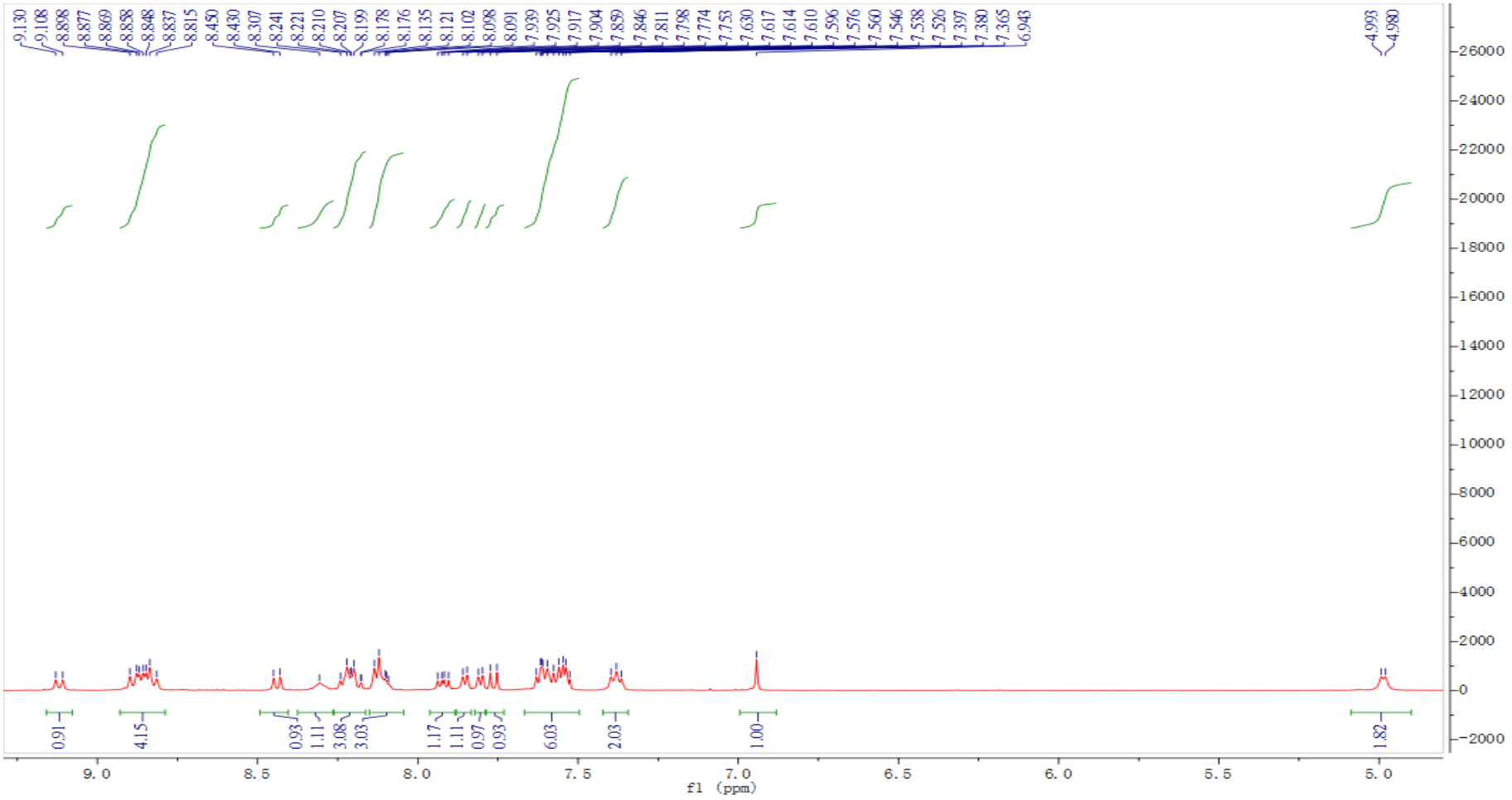

Figure S 4. ^{1}H NMR spectrum for [{Ru(bpy)$_2$}$_2$(μ_2-H$_2$L)](PF$_6$)$_4$ (in DMSO-d^6).

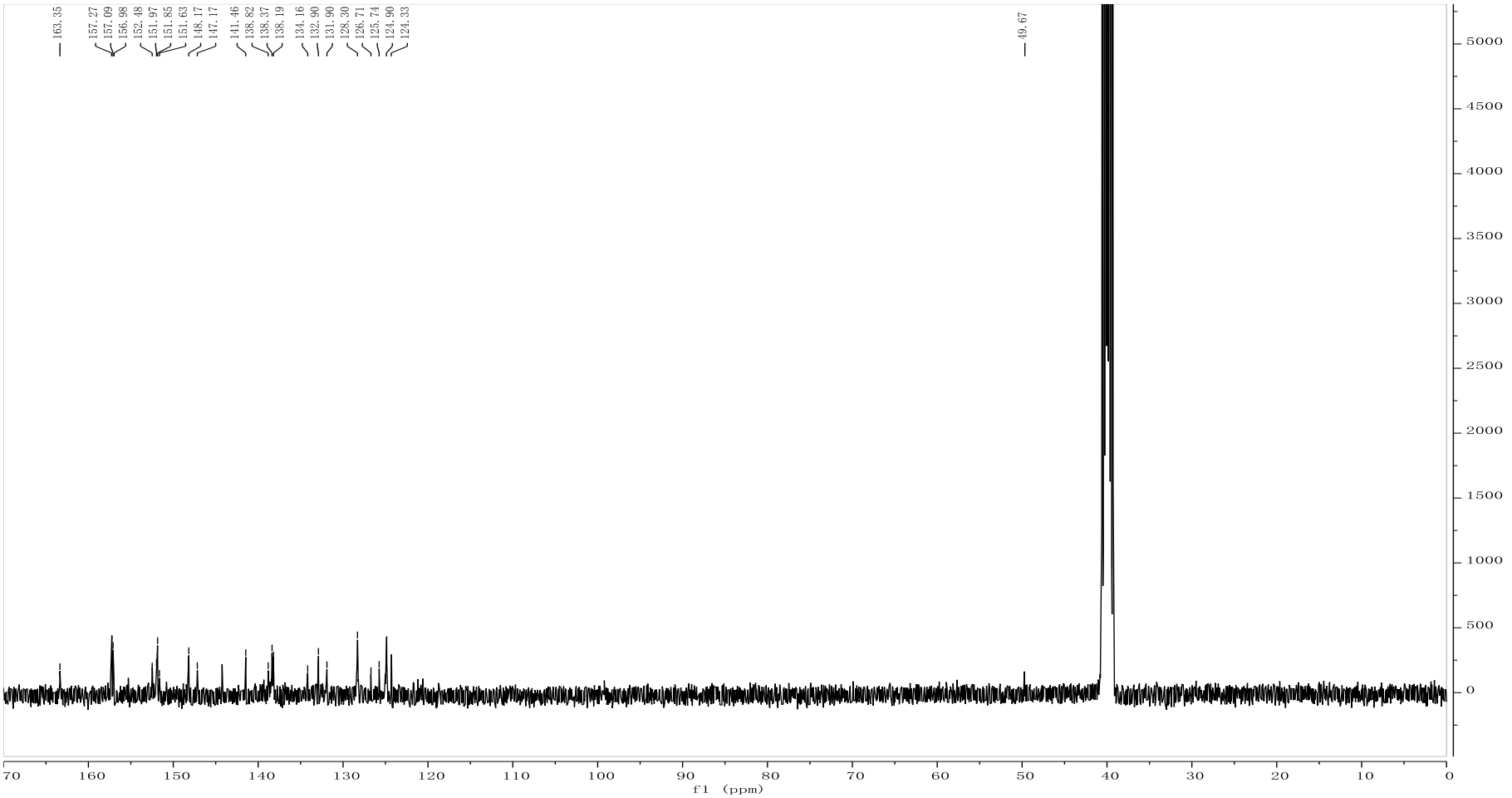

Figure S 5 ^{13}C NMR spectrum for $[\{Ru(bpy)_2\}_2(\mu_2\text{-}H_2L)](PF_6)_4$ (in DMSO-d^6).

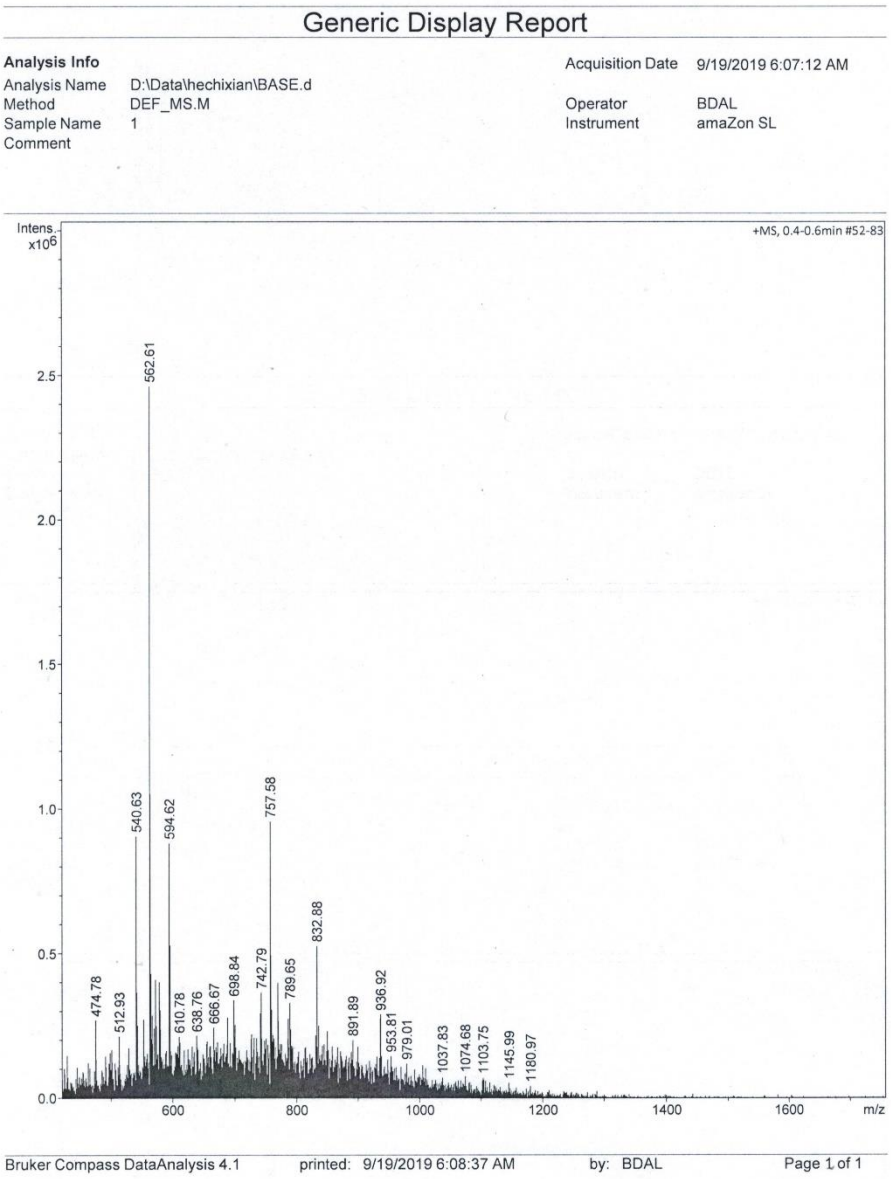

Figure S 6. ESI-MS for L.

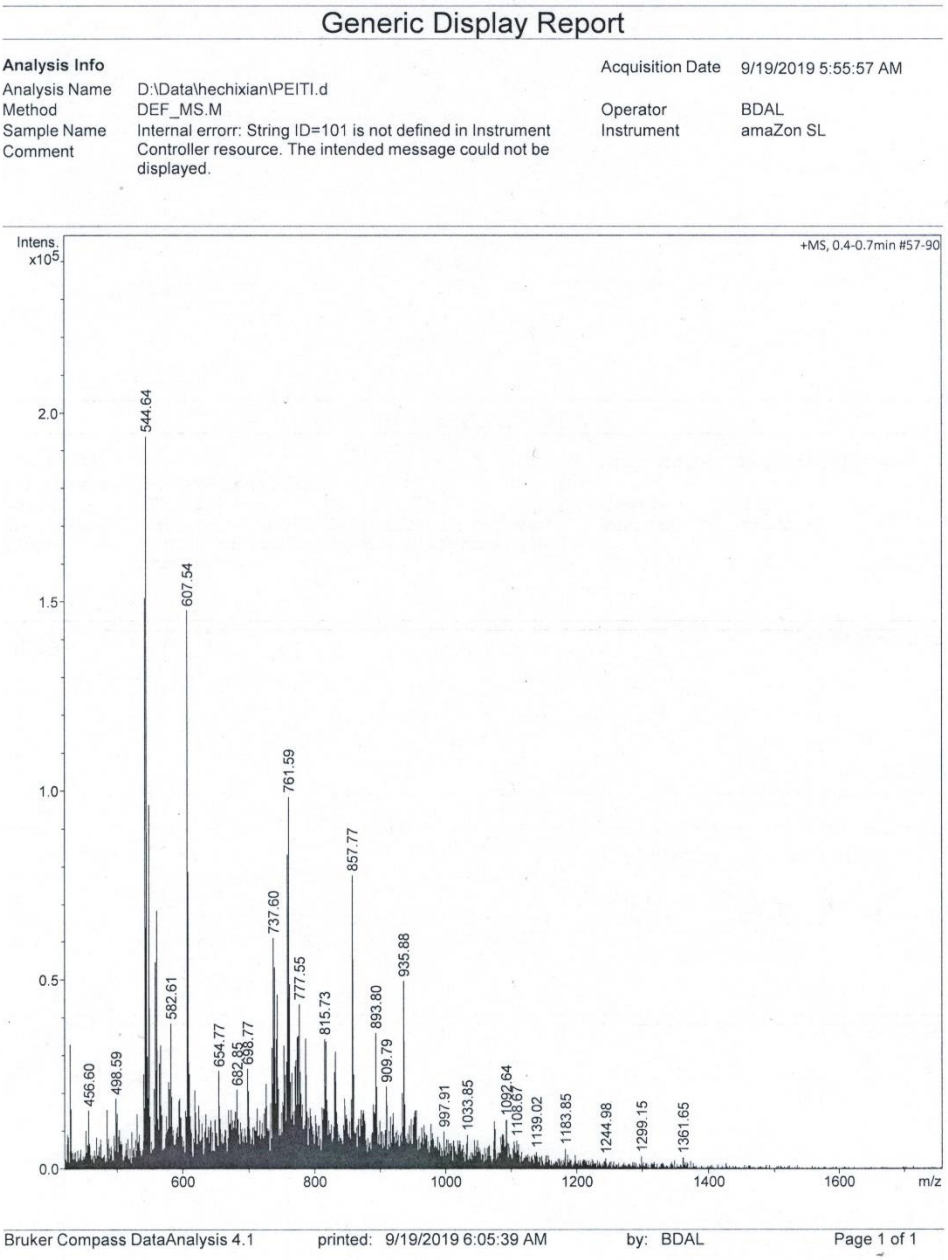

Figure S 7. ESI-MS for H_2L.

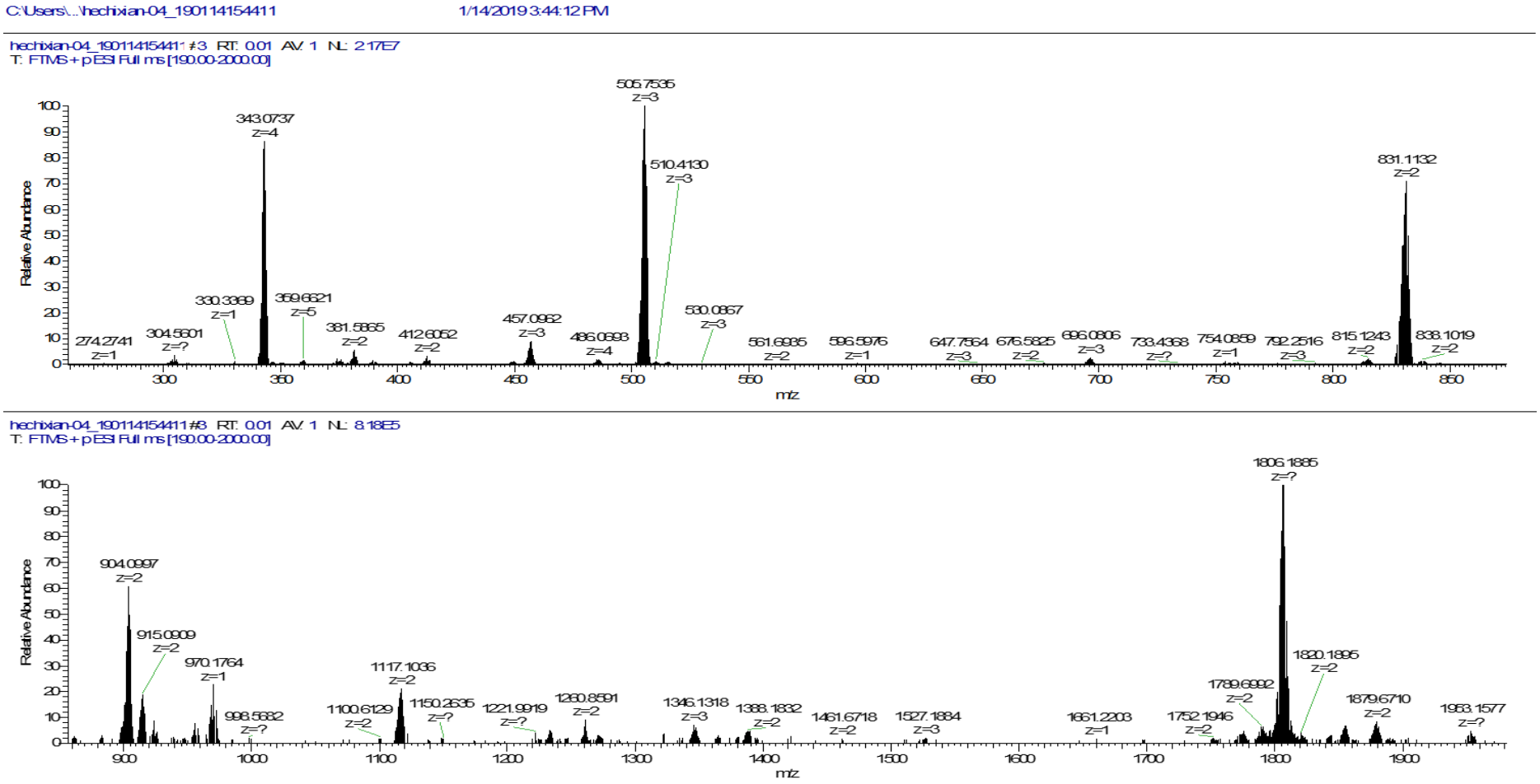

Figure S 8. ESI-HRMS for $[\{Ru(bpy)_2\}_2(\mu_2\text{-}H_2L)](PF_6)_4$

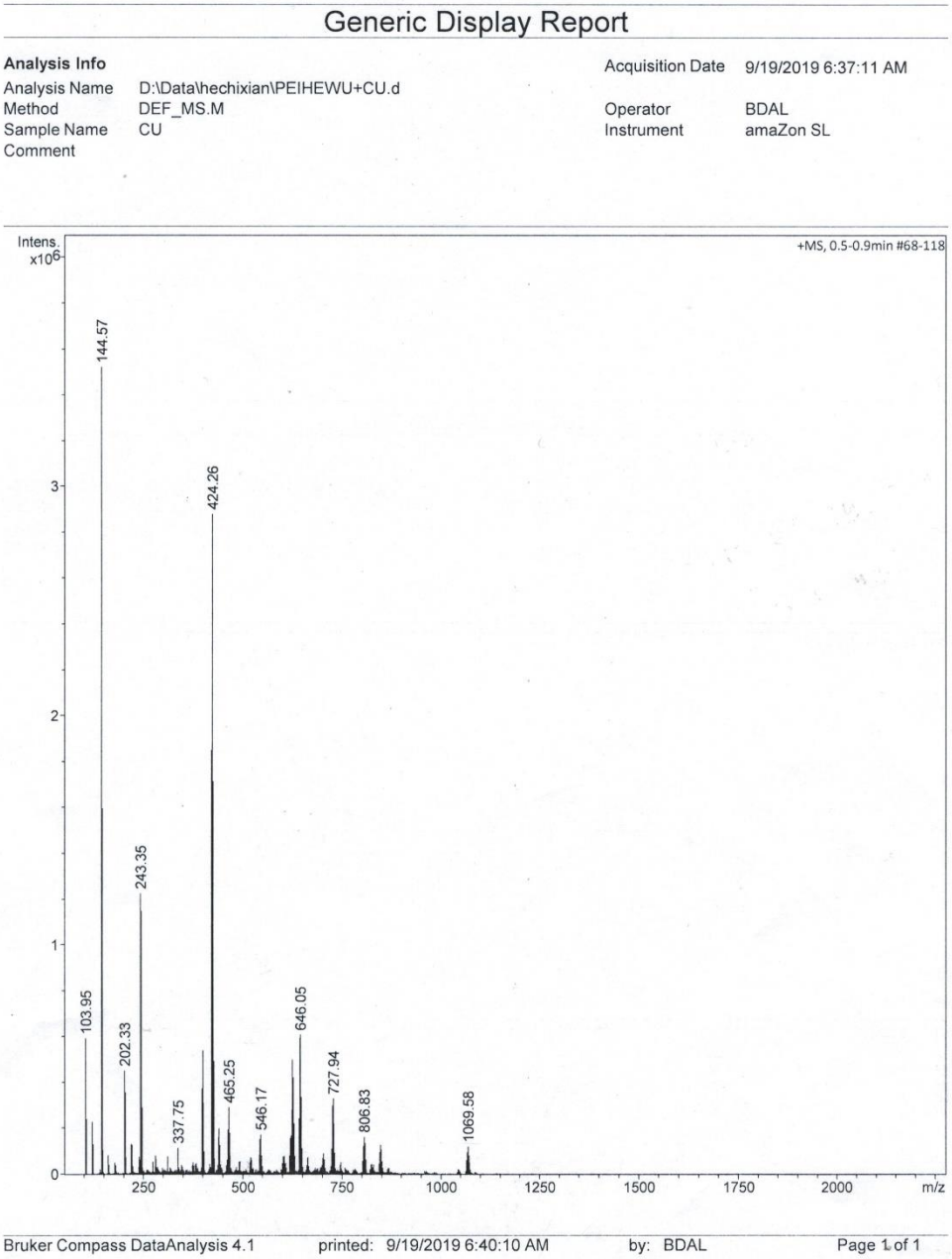

Figure S 9. ESI-MS for $[(\{Ru(bpy)_2\}_2(\mu_2\text{-}H_2L))_3Cu_2](PF_6)_{12}(ClO_4)_4$

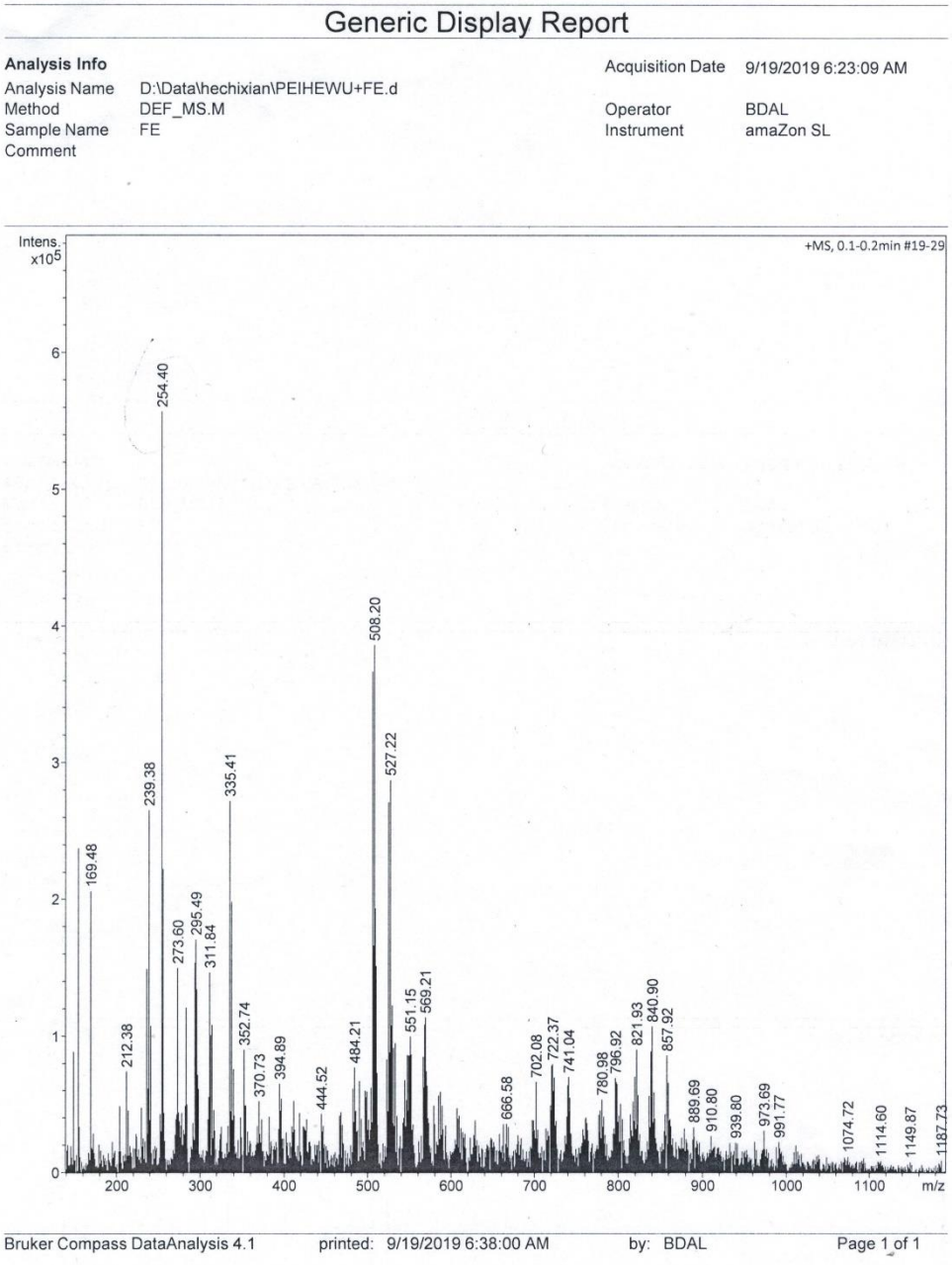

Figure S 10. ESI-MS for $[(\{Ru(bpy)_2\}_2(\mu_2\text{-}H_2L))Fe](PF_6)_4(ClO_4)_3$

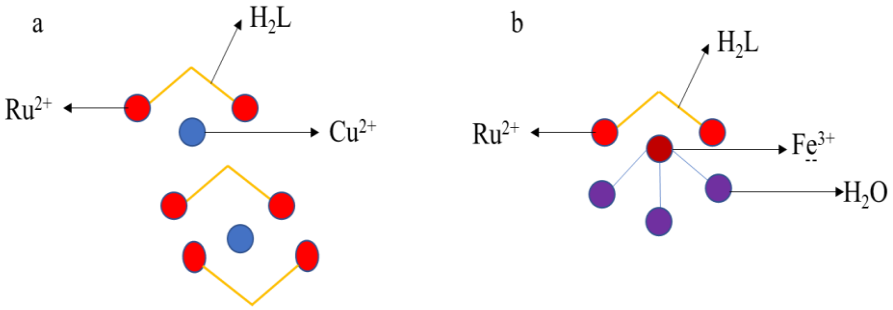

Figure S 11. The “sandwich” of hypothetical structures of new product of Cu^{2+}(a) and hypothetical structures of new product of Fe^{3+}(b)