

Supplementary Information

for

Gravimetric and electrochemical statistical optimizations for improving copper corrosion resistance in hydrochloric acid using thiosemicarbazone-linked 3-acetylpyridine

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Table S1. Binding energies (eV), relative intensity, and their assignment for Cl 2p, C 1s, N 1s, S 2p, and Cu 2p peak observed for copper strip in HCl at an optimum concentration of T3AP

Sample	Chemical species	Photoemission angle (°)	Assignment	BE (eV)	Relative intensities (%)
Copper (Blank)	Cl 2p	0	H-Cl	198.91	77.05
			CuCl ₂	200.56	22.95
	Cu 2p	0	Cu ⁺ /CuCl	932.20	83.49
			Cu ⁺ /Cu ₂ O	932.53	16.51
Copper with T3AP	C 1s	0	C=C	284.74	63.51
			C=S	287.89	17.18
			C-C	282.48	11.77
			C-N/C=N	286.97	7.54
Copper with T3AP	N 1s	0	N-H	399.17	61.41
			N-N/C=N ⁺	399.11	20.13
			N-Cu	398.55	12.10
			N-O	397.22	6.35
Copper with T3AP	S 2p	0	Cu-S	162.40	71.40
			C-S	163.25	15.06
			S-O	167.52	13.76
Copper with T3AP	Cu 2p	0	Cu-S	932.02	39.00
			Cu-N	933.23	21.40
			Cu ⁺ /CuCl	932.26	15.62

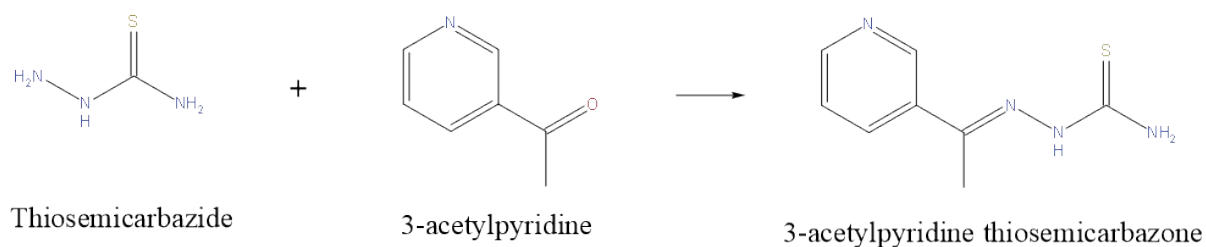


Figure S1. The general reaction synthesis of T3AP

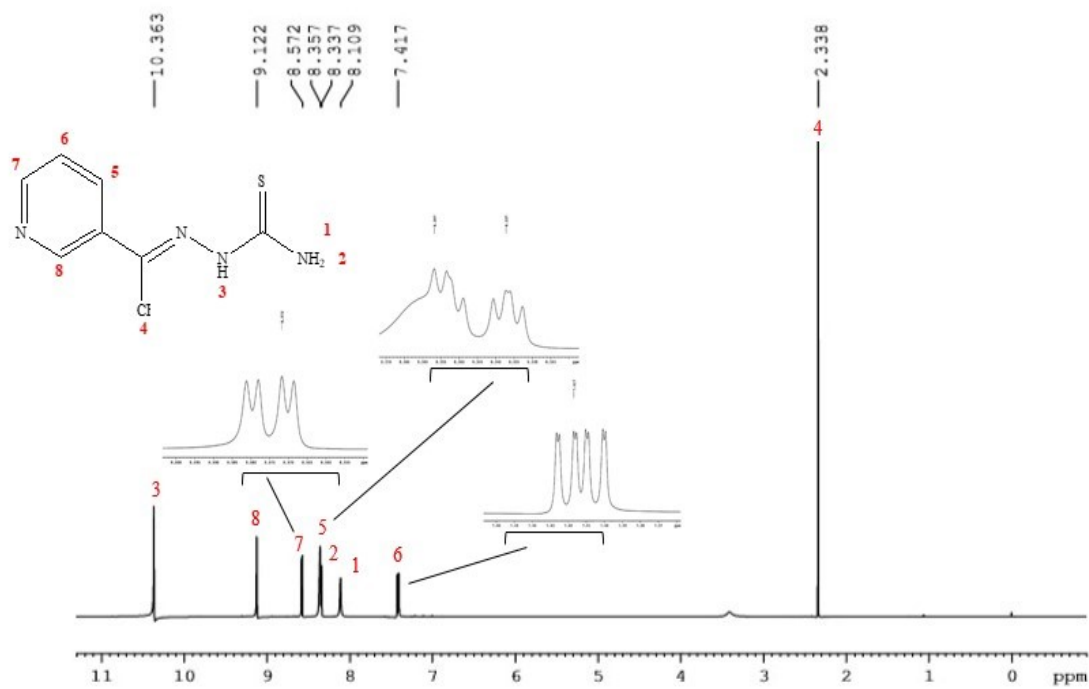


Figure S2. The ¹H NMR spectrum for T3AP compound

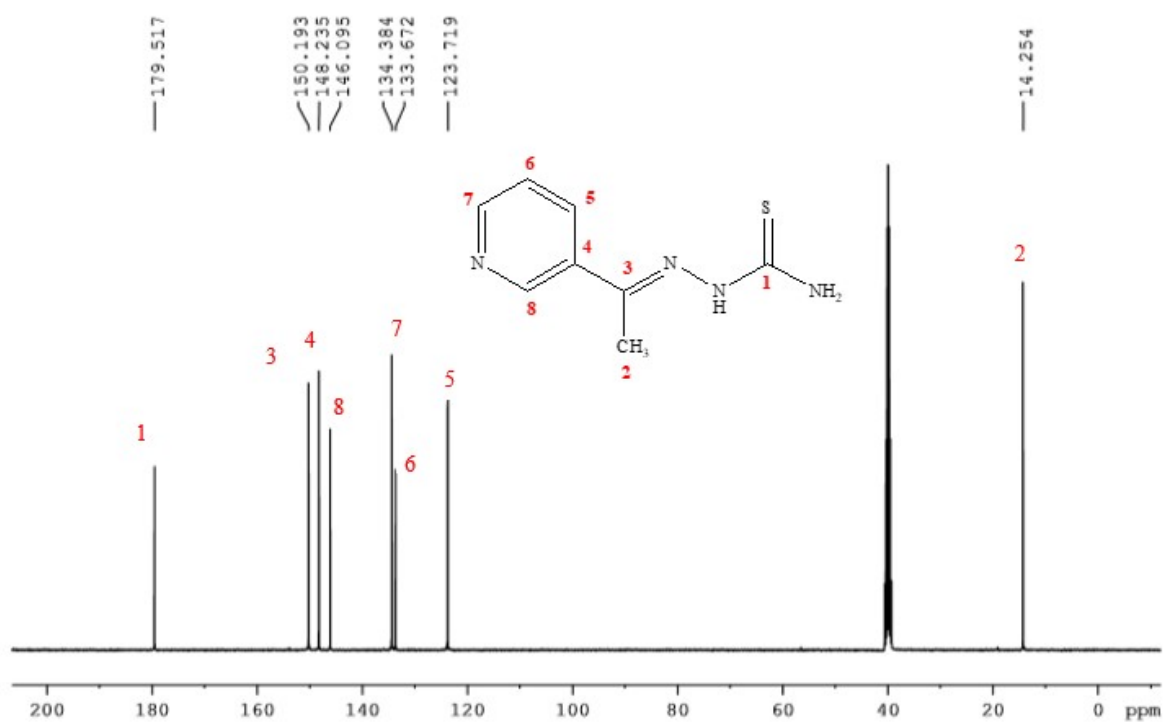
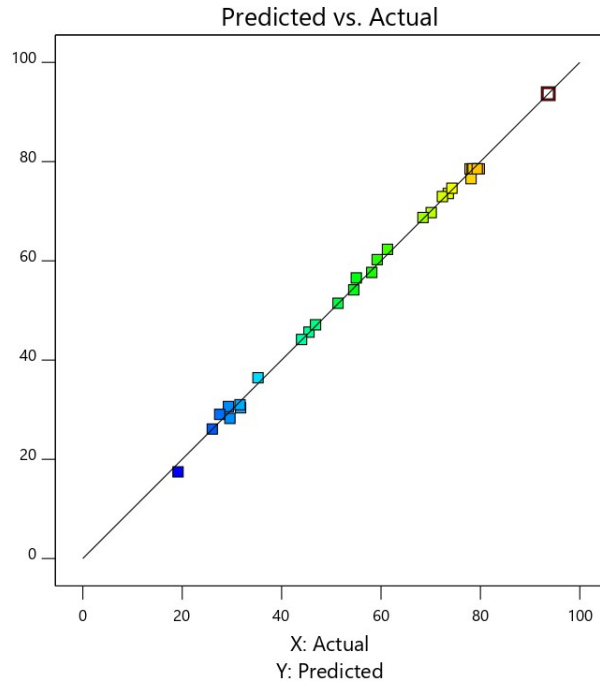
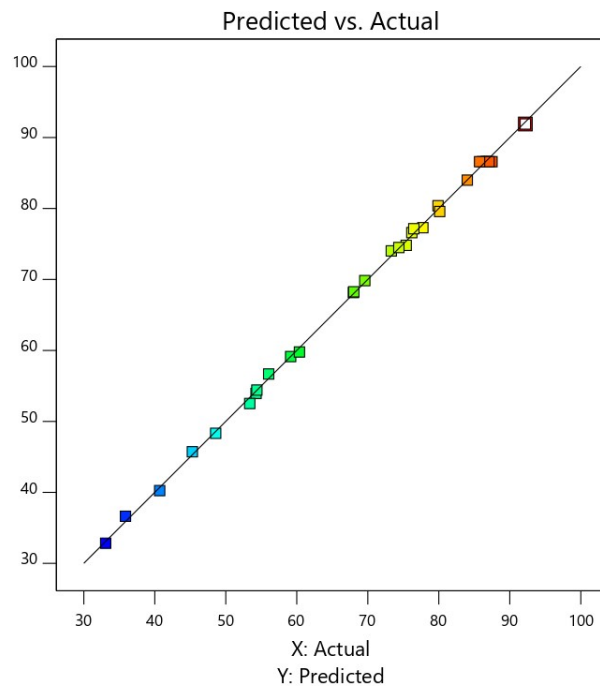


Figure S3. The ¹³C NMR spectrum for T3AP compound



(a)



(b)

Figure S4. The graph of predicted vs actual data for both responses (a) WL IE, (b) EIS IE

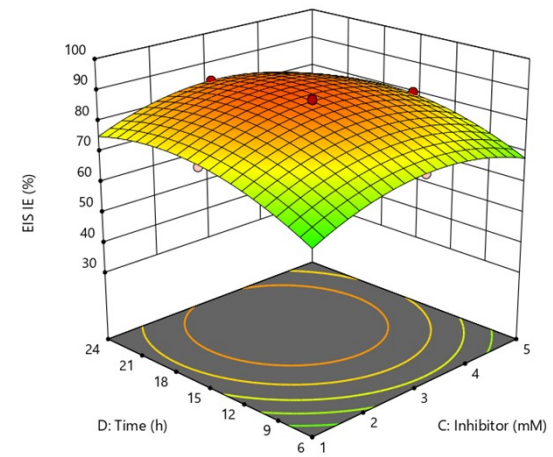
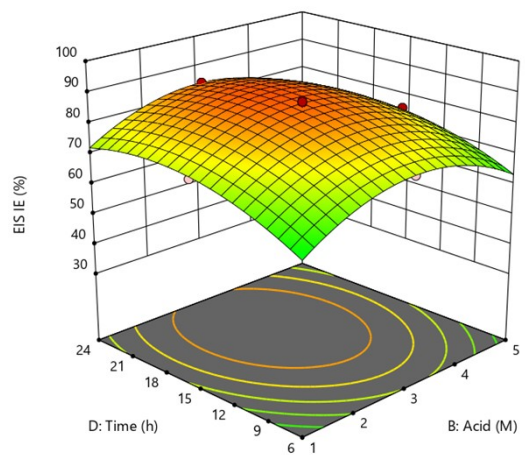
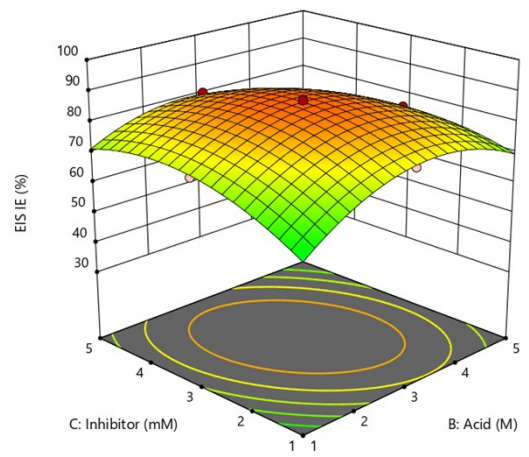
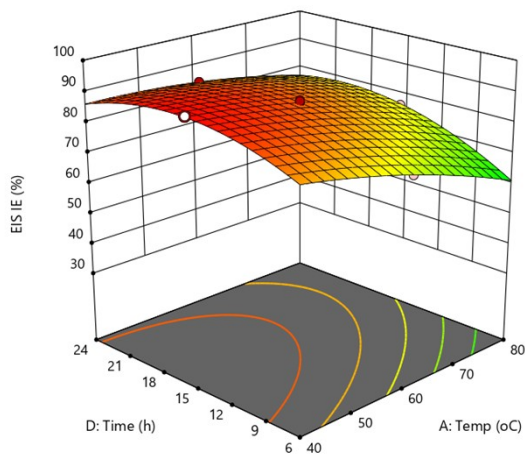
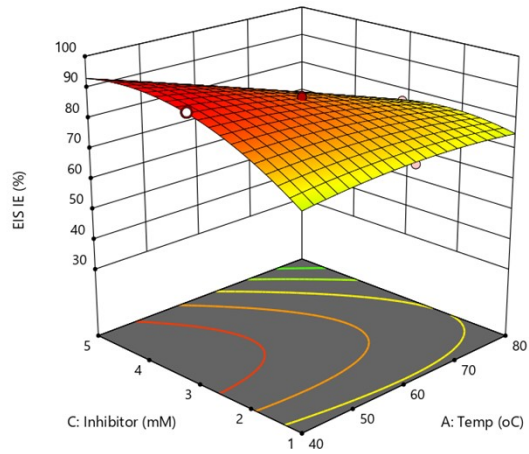
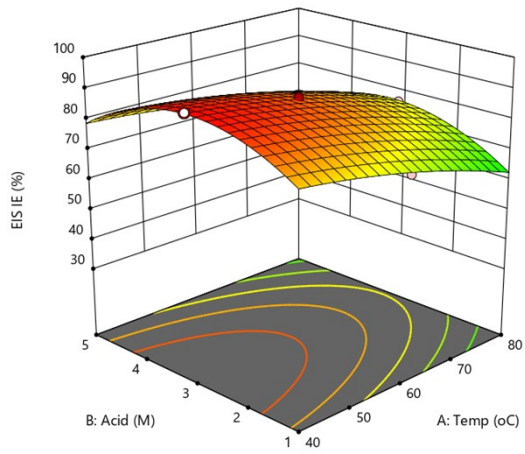


Figure S5. 3D graph of EIS inhibition efficiency response of T3AP

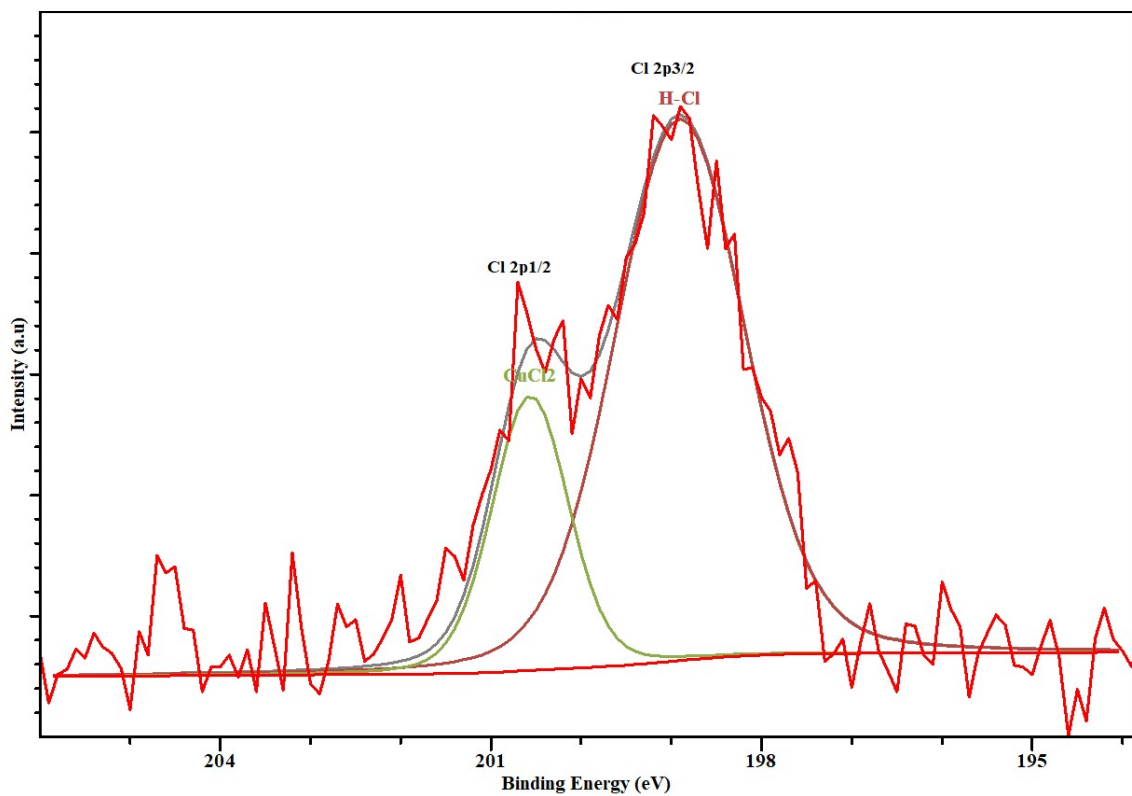


Figure S6. The XPS spectrum for Cl 2p of untreated samples

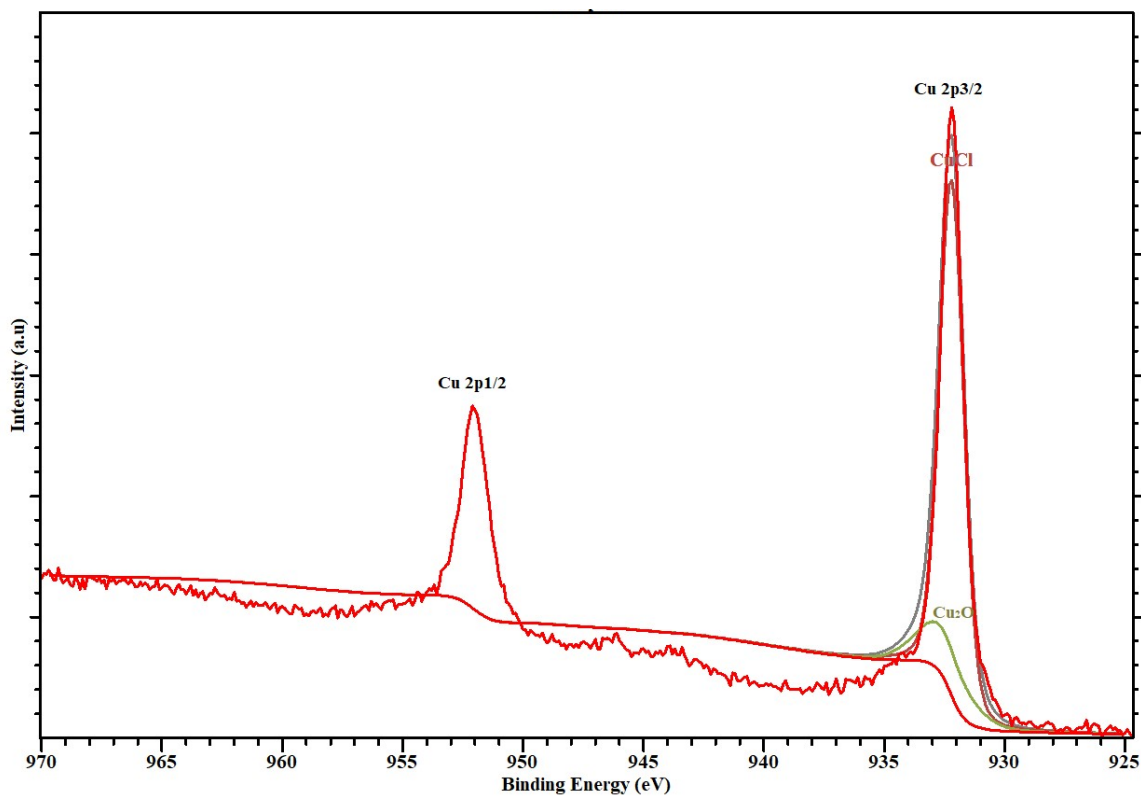


Figure S7. The XPS spectrum for Cu 2p of untreated samples

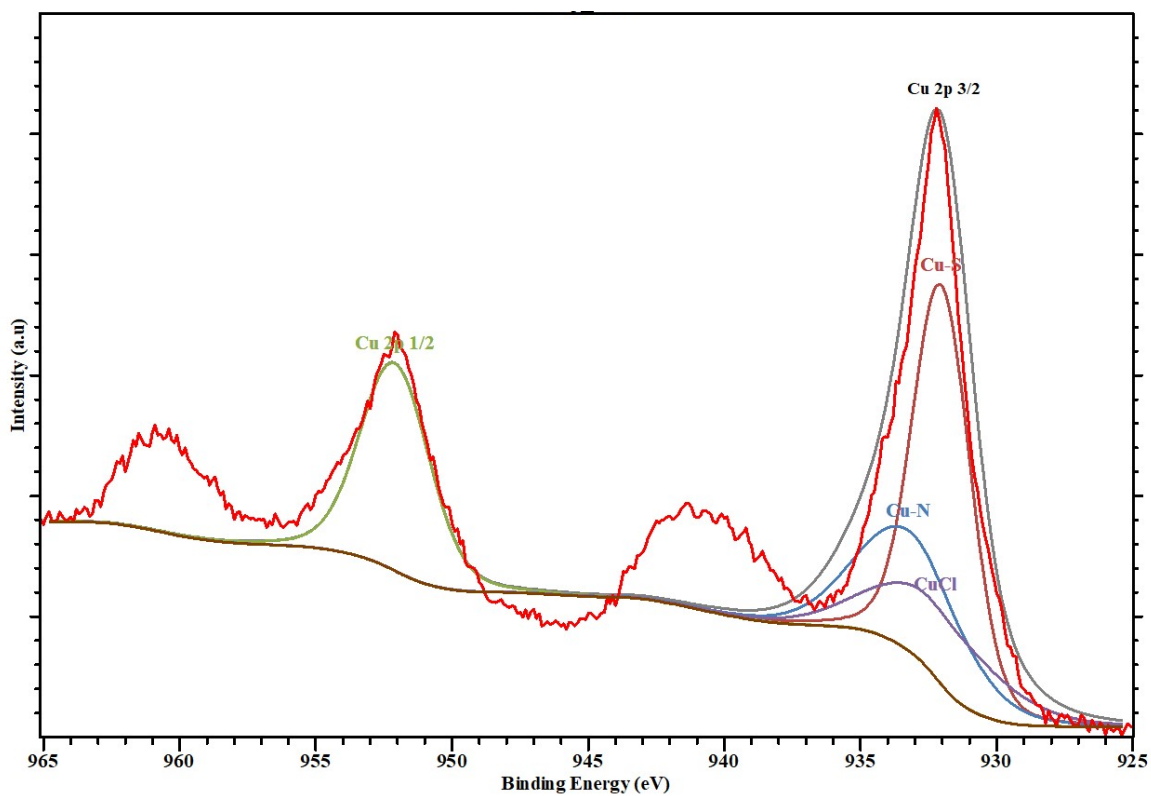


Figure S8. The XPS spectrum for Cu 2p of samples with inhibitor T3AP

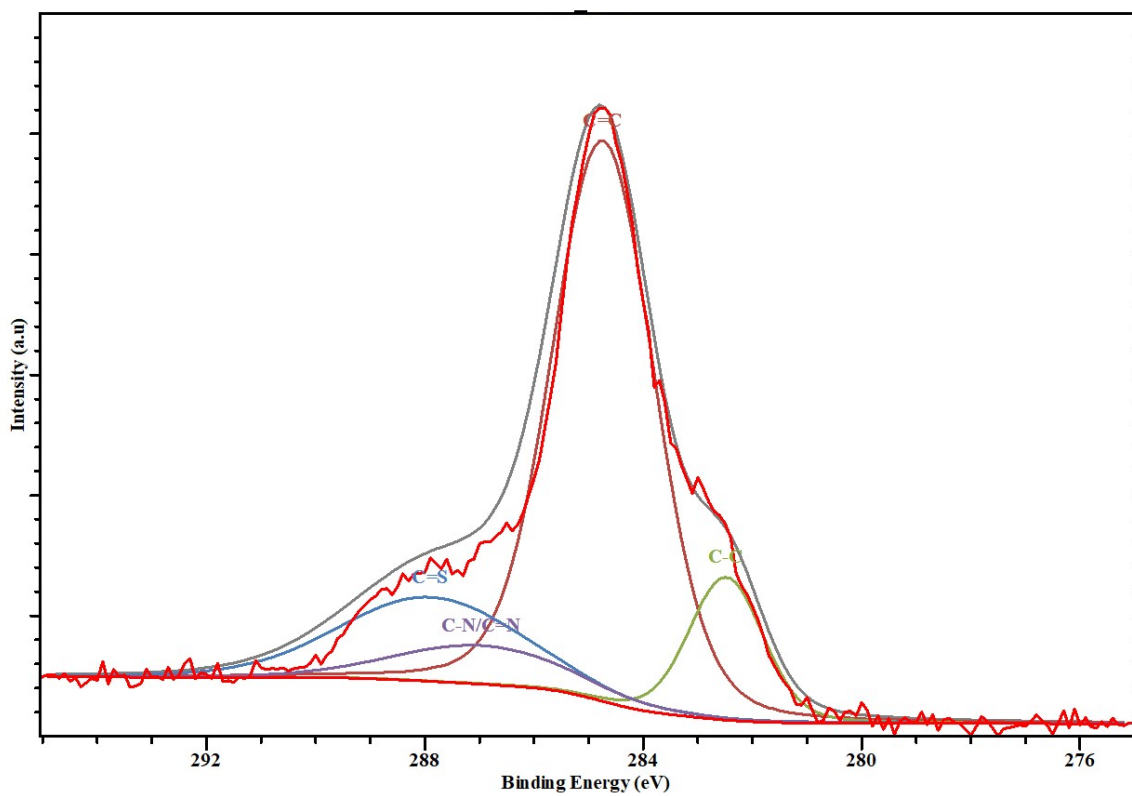


Figure S9. The XPS spectrum for C 1s of samples with inhibitor T3AP

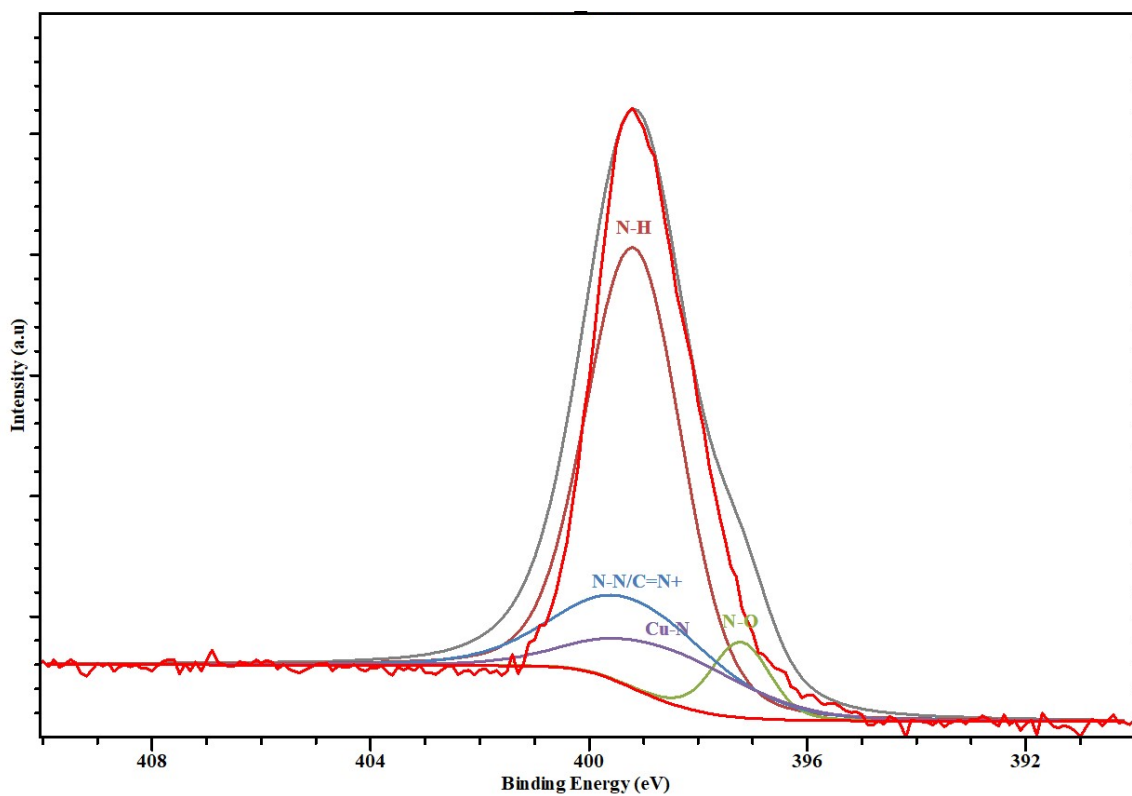


Figure S10. The XPS spectrum for N 1s of samples with inhibitor T3AP

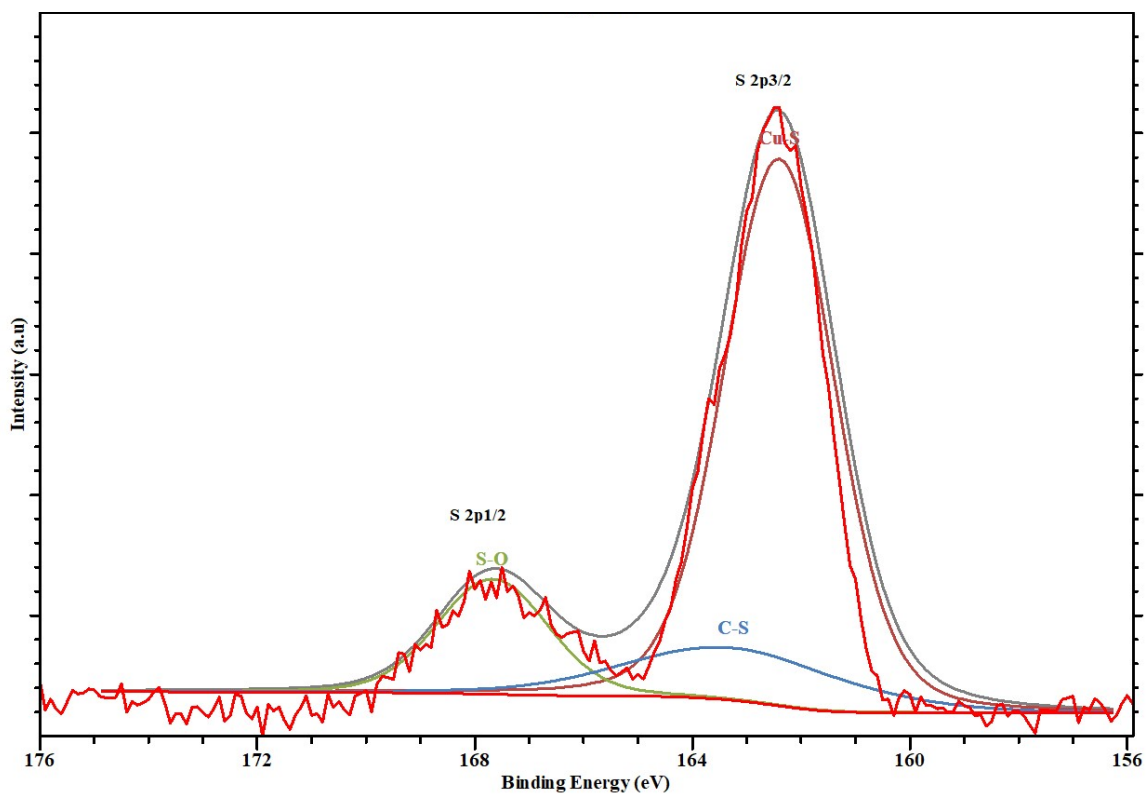


Figure S11. The XPS spectrum for S 2p of samples with inhibitor T3AP

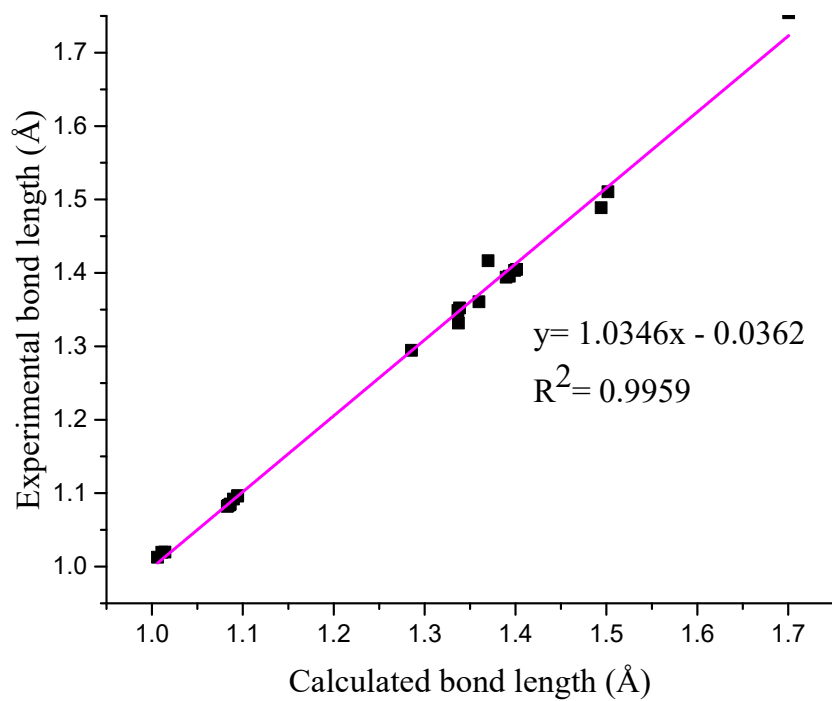


Figure S12. The experimental vs theoretical bond length of T3AP compound