Supplementary Material

Design of Iron (III) Phthalocyanine/Reduced Graphene Oxide Nanocomposites on Nickel Foam as Hybrid Supercapacitors

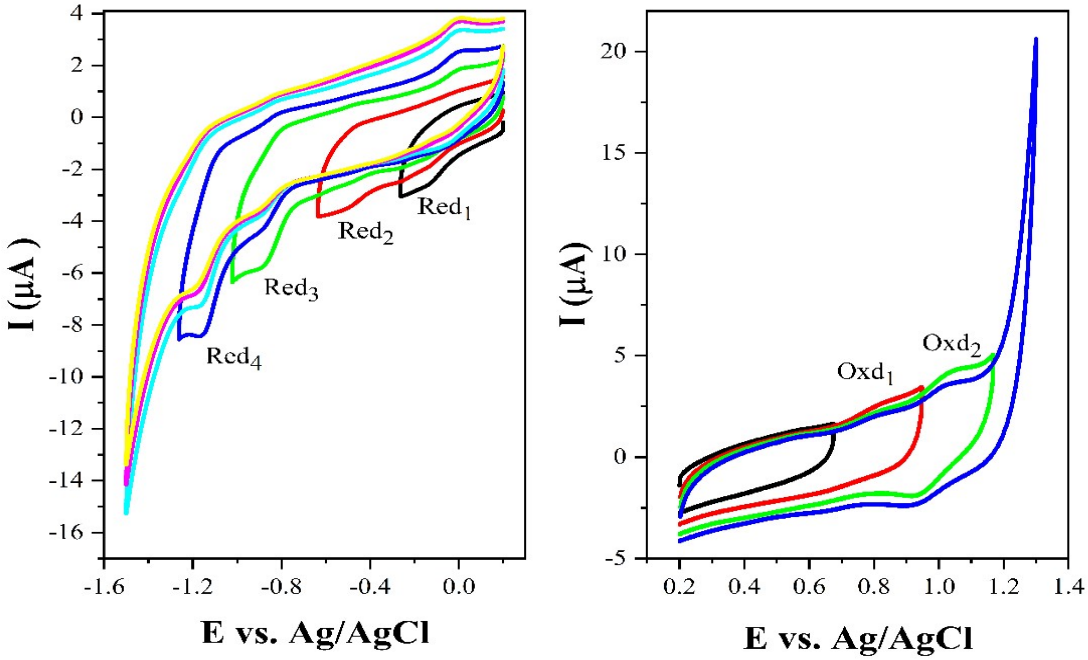
Nazlı Farajzadeh Öztürk,[a,b] Hacer Yasemin Yenilmez,[a‡] Özlem Budak Doğramacı,[b‡] Atıf Koca[b] and Zehra Altuntaş Bayır*[a]

[a.] Department of Chemistry, Istanbul Technical University, TR-34469 Istanbul, Türkiye. E-mail: bayir@itu.edu.tr

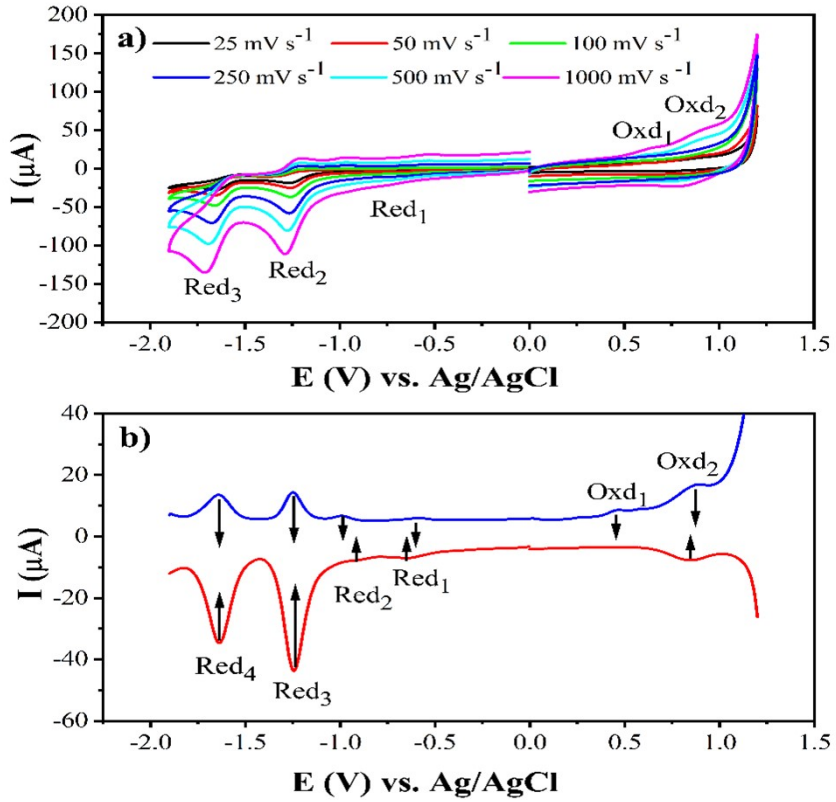
[b] *Department of Analytical Chemistry, Faculty of Pharmacy, Acıbadem Mehmet Ali Aydınlar University, Ataşehir, TR-34752, Istanbul, Türkiye*

[c.] Department of Chemical Engineering, Engineering Faculty, Marmara University, Istanbul, Türkiye

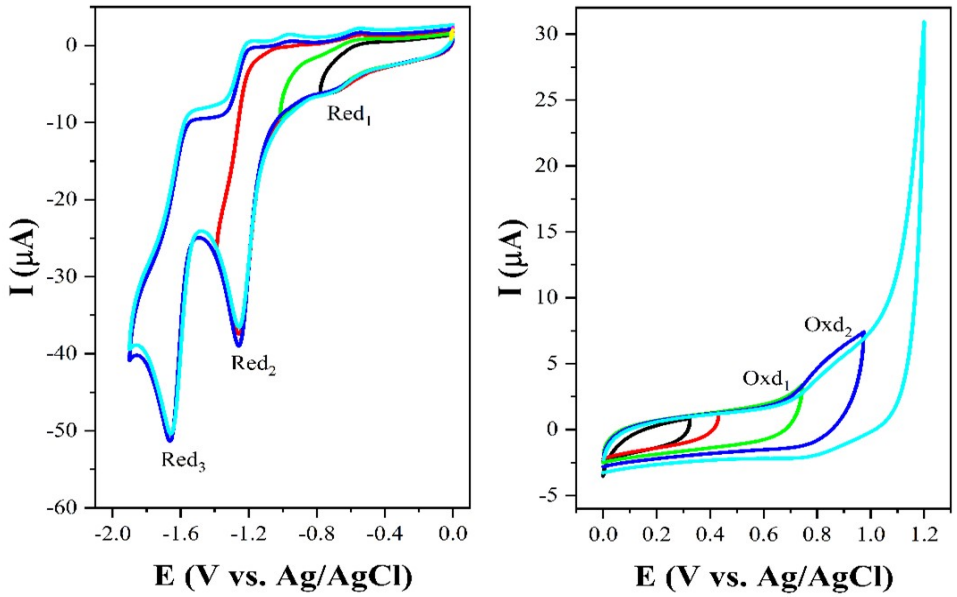
[‡] These authors contributed equally to this work.



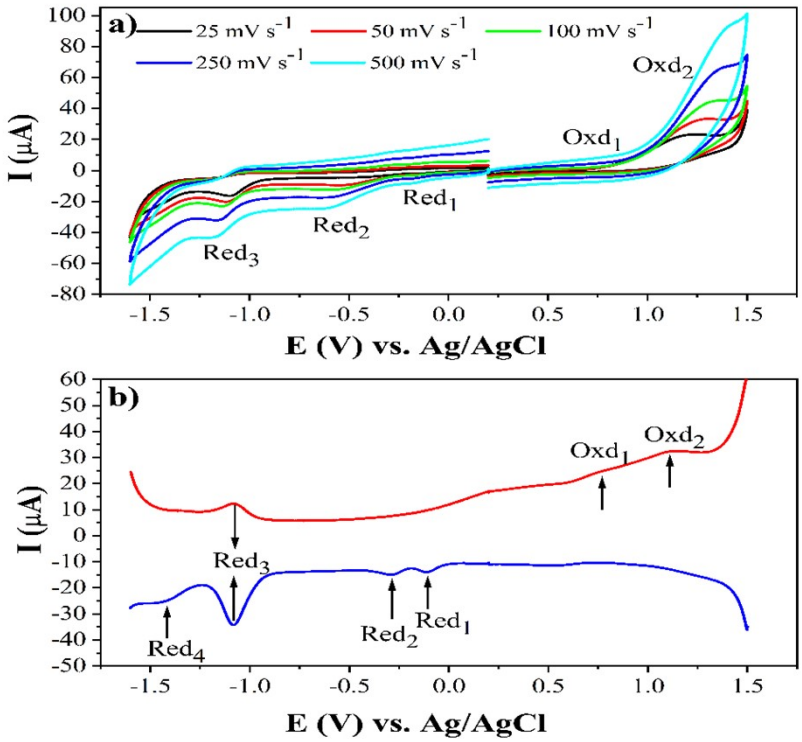
SM1 CVs of compound **1** recorded at 100 mVs^{-1} scan rate with different vertex potentials within negative and positive potential ranges on a GCE working electrode in AN/TBAP electrolyte.



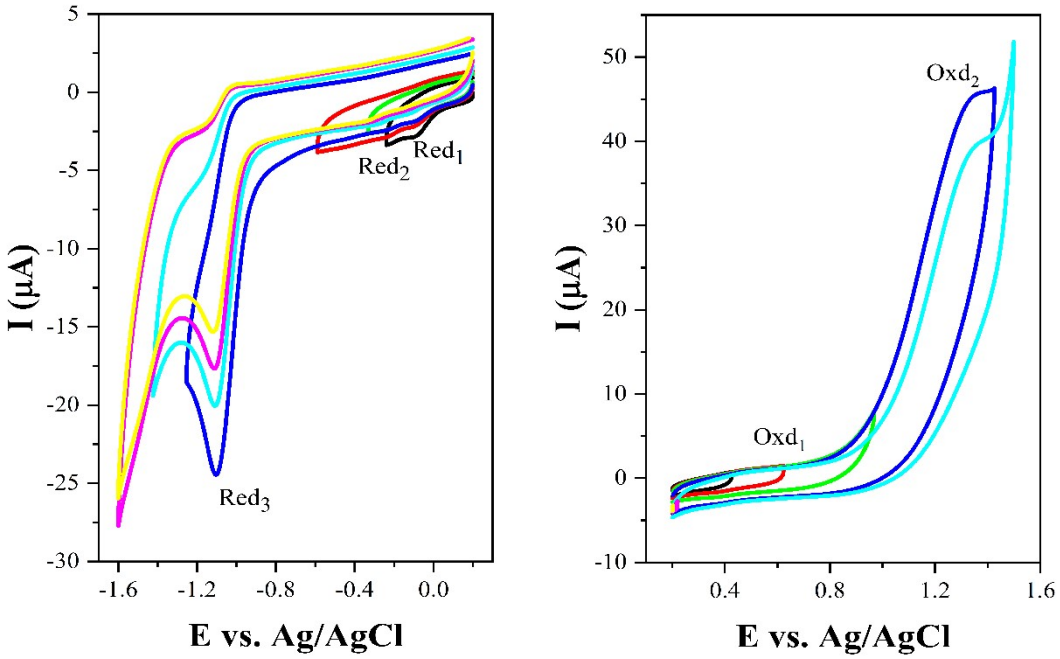
SM2 CVs and SWVs of compound **2** recorded at various scan rates on a GCE working electrode in AN/TBAP.



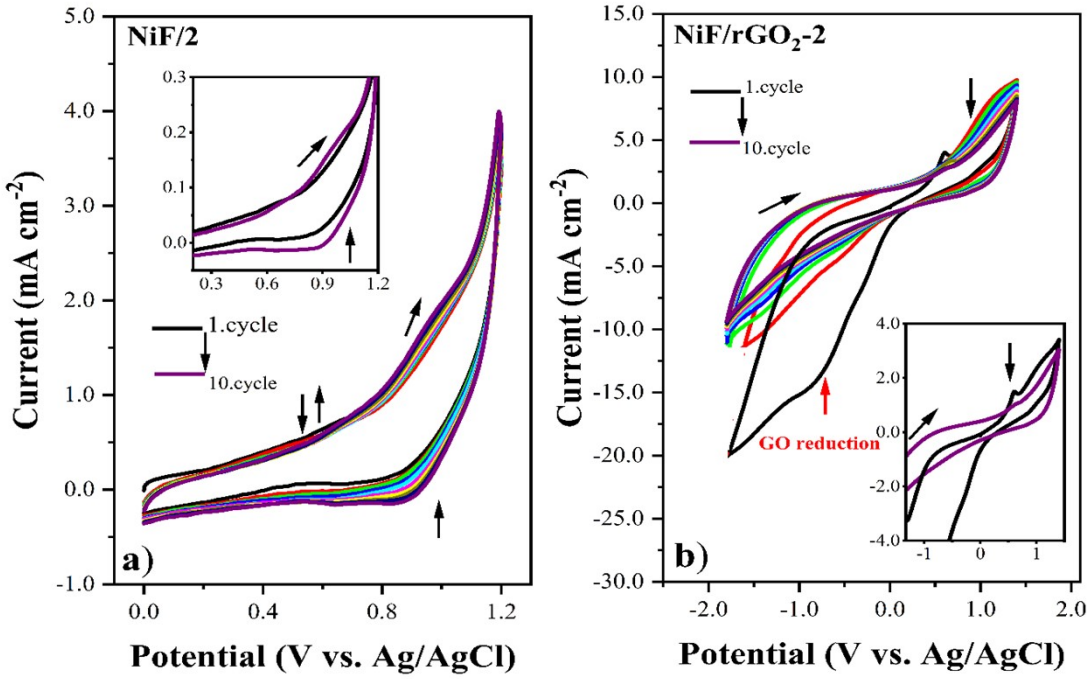
SM3 CVs of compound **2** recorded at 100 mV s^{-1} scan rate with different vertex potentials within negative and positive potential ranges on a GCE working electrode in AN/TBAP electrolyte.



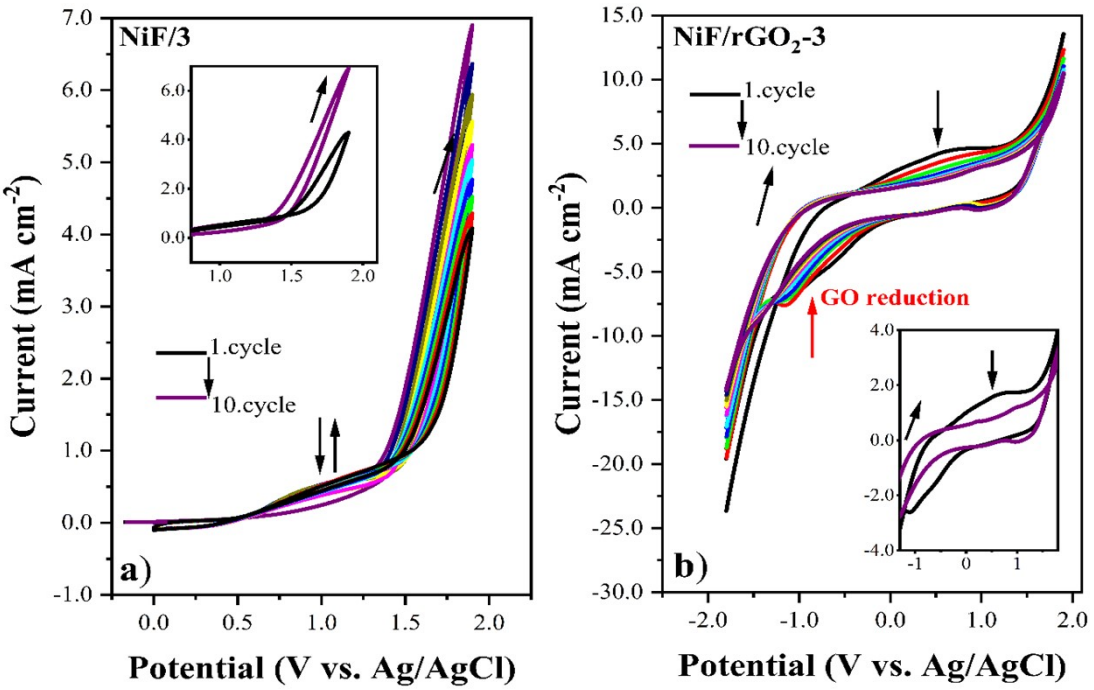
SM4 CVs and SWVs of compound **3** recorded at various scan rates on a GCE working electrode in AN/TBAP.



SM5 CVs of compound **3** recorded at 100 mV s^{-1} scan rate with different vertex potentials within negative and positive potential ranges on a GCE working electrode in AN/TBAP electrolyte.



SM6 rCVs scans of a) NiF/**2** and b) NiF/rGO$_2$-**2** electrodes a scan rate of 100 mV s^{-1} in the AN/TBAP medium.



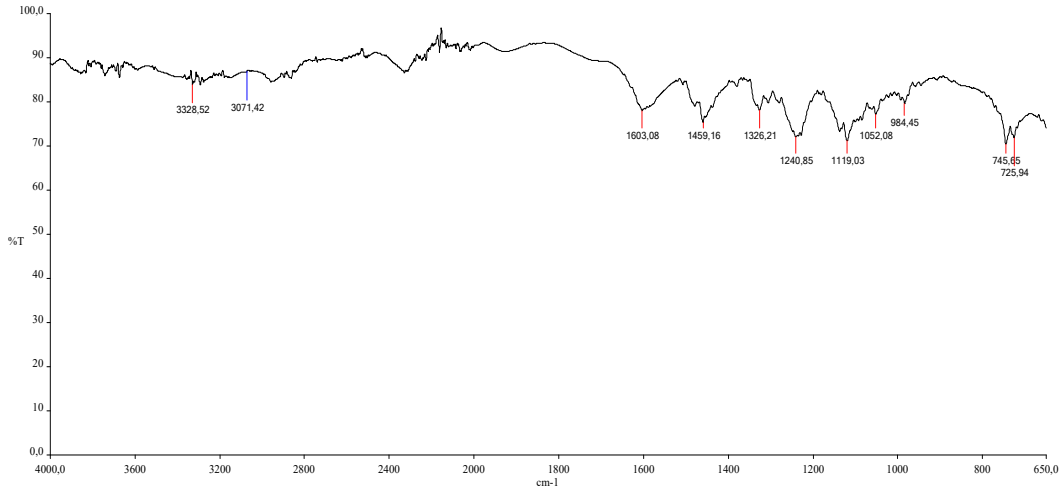
SM7 rCVs scans of a) NiF/**3** and b) NiF/rGO$_2$-**3** electrodes a scan rate of 100 mV s^{-1} in the AN/TBAP medium.

Table SM1. The Rs values of the electrodes.

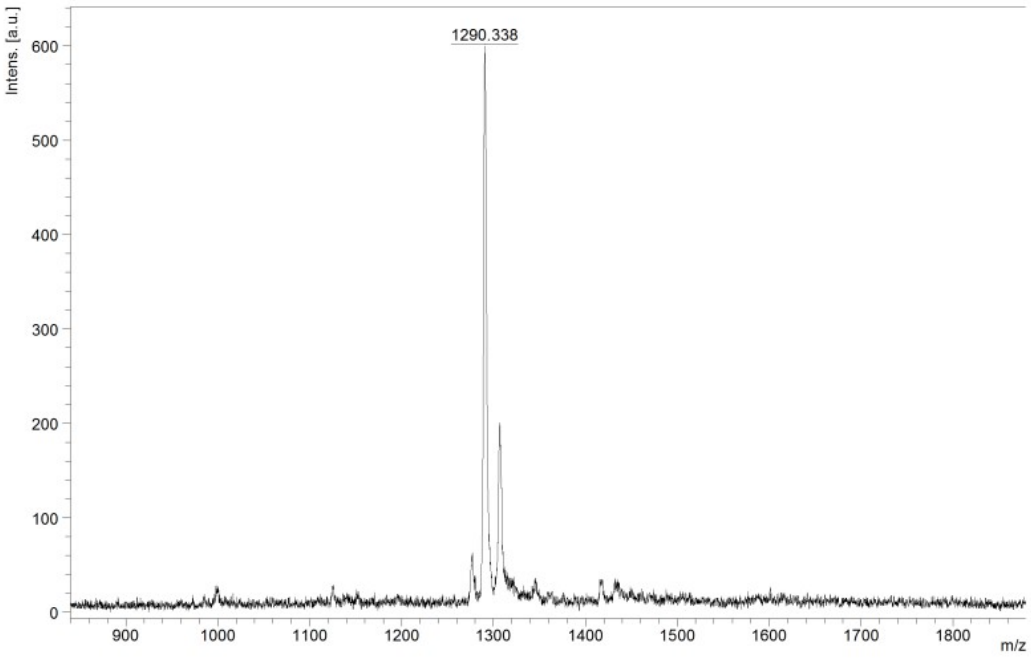
Electrode	Rs (Ω)
NiF/**1**	1.64
NiF/rGO_2-**1**	1.00
NiF/**2**	1.82
NiF/rGO_2-**2**	1.21
NiF/**3**	2.02
NiF/rGO_2-**3**	1.53

Table SM2. Supercapacitive performance of previously reported metallophtalociyanine structures: a comparative summary.

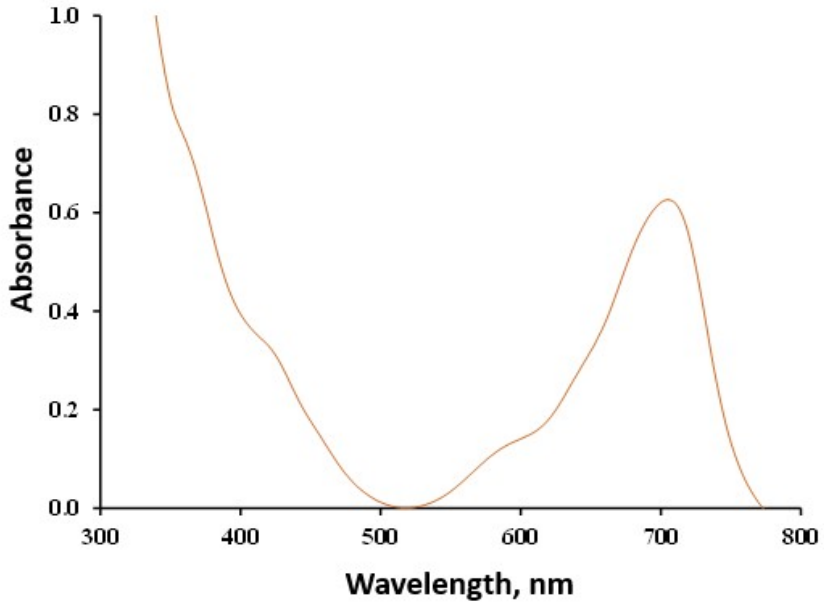
Electrode	Method	Specific capacitance	Electrolyte	Retention	Ref.
PdTAHAPc	Drop casting	245 F g^{-1} (0.2 A g^{-1}) 221 g^{-1} (1 A g^{-1})	1 M H_2SO_4	100% (5000 cycle)	[1]
CoPc-COF/CS	Freeze-drying	556 F g^{-1} (1 A g^{-1})	6 M KOH	-	[2]
CoNCCs	Microwave-assisted	213.4 F g^{-1} (0.5 A g^{-1})	1 M H_2SO_4	85.3% (1750 cycle)	[3]
SWCNTs/Pc (SPCM -10)	Drop casting	228 F g^{-1} (0.5 A g^{-1})	6 M KOH	93% (2000 cycle)	[4]
BTCuPc	Drop casting	265 F g^{-1} (5 mV s^{-1})	3 M KCl	-	[5]
$FePcGO_2$	Coating with binder	514 F g^{-1} (1 A g^{-1})	6 M KOH	-	
Co(NO2)4Pc-rGO 1/6	-	150.22 F g^{-1} (4 A g^{-1})		116.6% (5000 cycle)	[6]
NiMe2Pc:CNT-COOH (6:10)	Doctor blade	33 0.5 F g^{-1} (0.25 A g^{-1})	1 M H_2SO_4	-	[7]
FePc@MWCNTs	Knife coating	65.3 F g^{-1} (0.25 A g^{-1})	1 M H_2SO_4	-	[8]
CoTTPCAPc/MWCNT/GC	Drop casting	475.65 F g^{-1} (50 mV s^{-1})	1 M H_2SO_4	89.1% (1000 cycle)	[9]
NiF/rGO_2-1	**One-step electrodeposition**	**590.4 F g^{-1} (0.5 A g^{-1})** **494.8 F g^{-1} (1 A g^{-1})**	**2 M KOH**	**85.2% (5000 cycle)**	**This work**



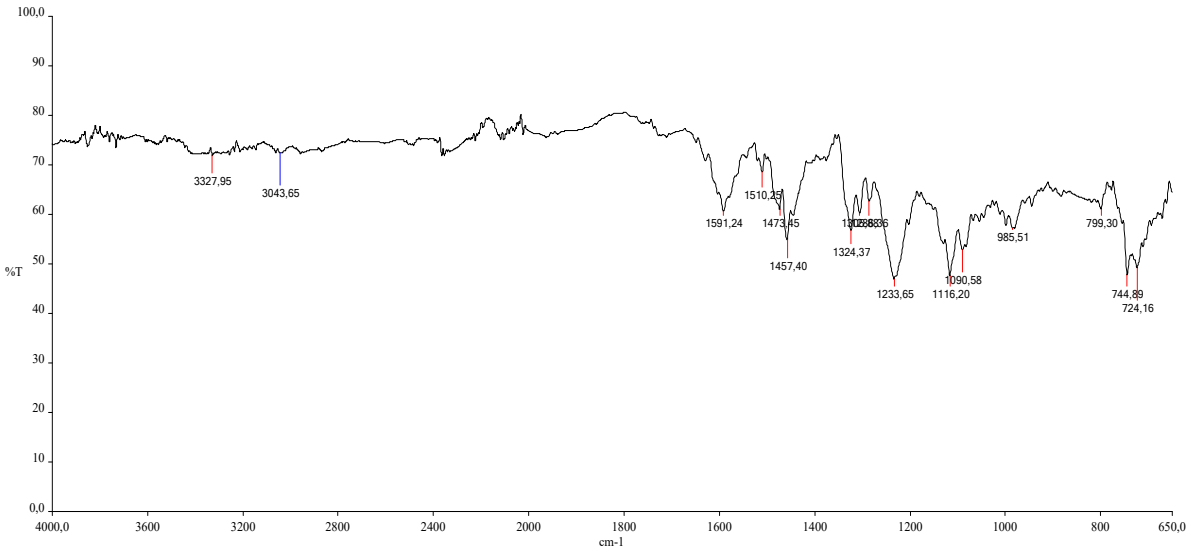
SM8 FT-IR spectrum of compound **1**.



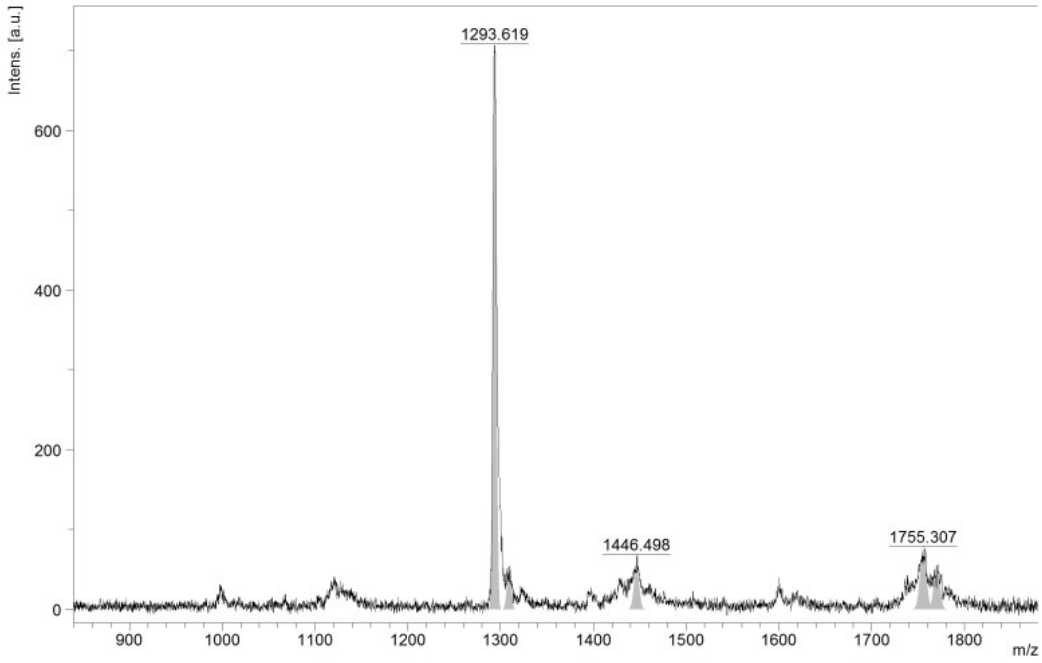
SM9 Mass Spectrum of compound **1**.



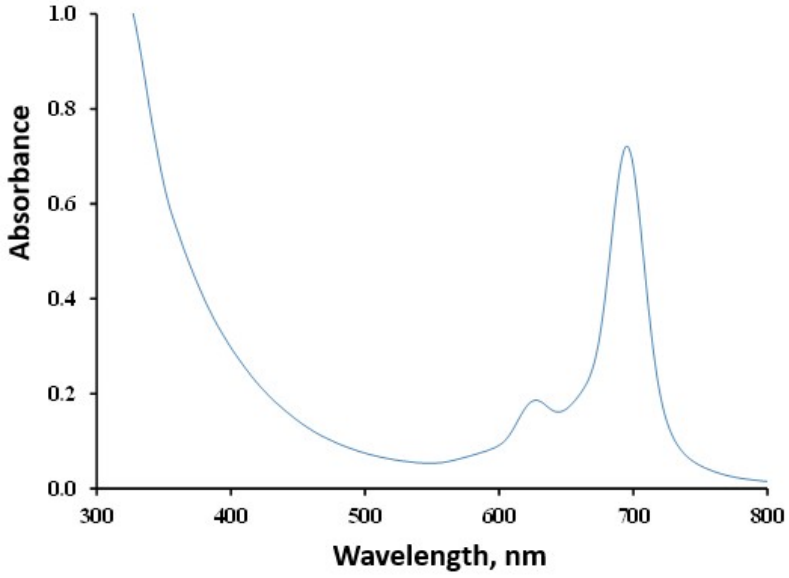
SM10 UV-vis spectrum of compound **1**.



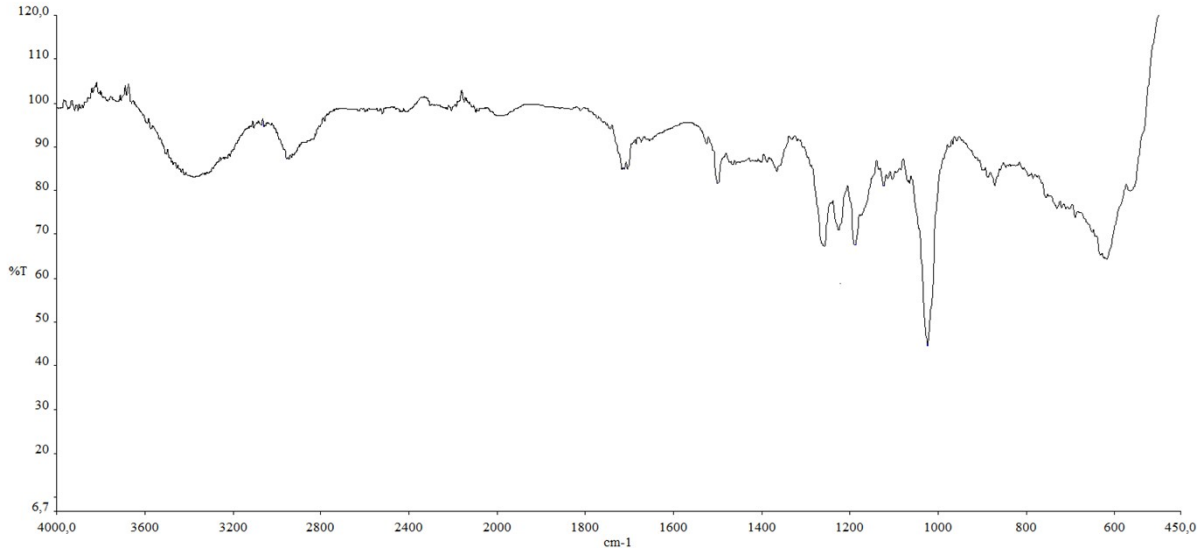
SM11 FT-IR spectrum of compound **2**.



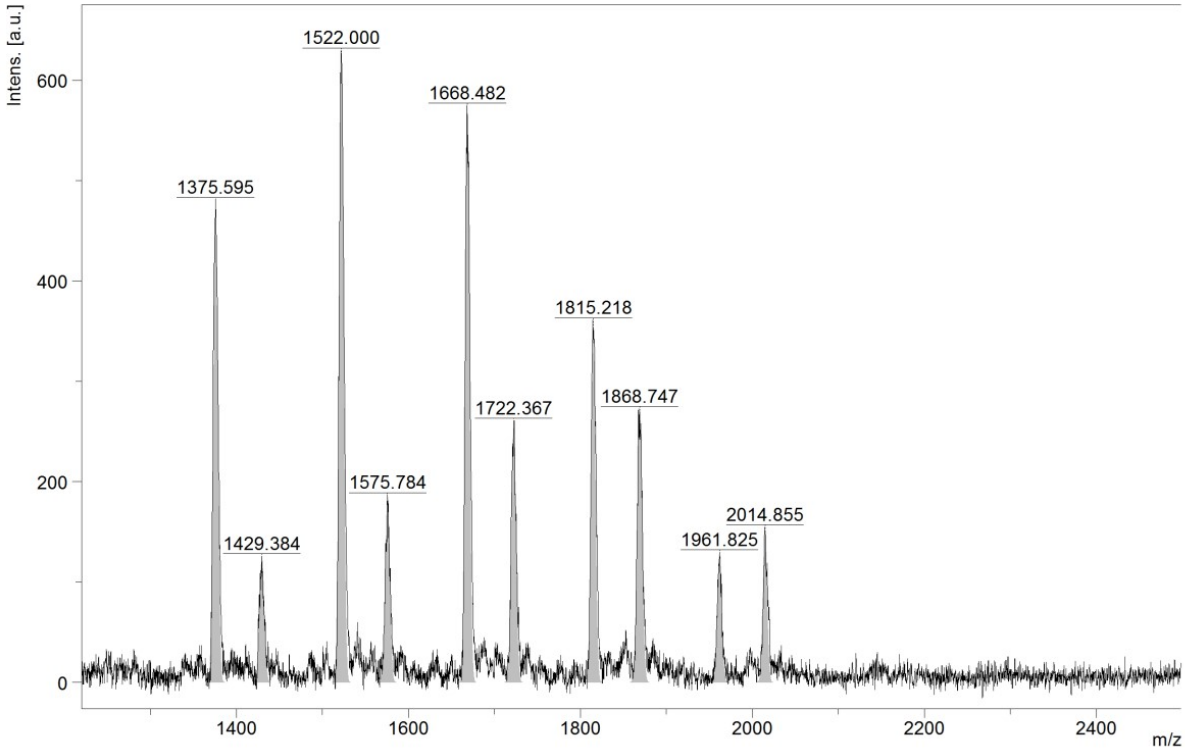
SM12 Mass Spectrum of compound **2**.



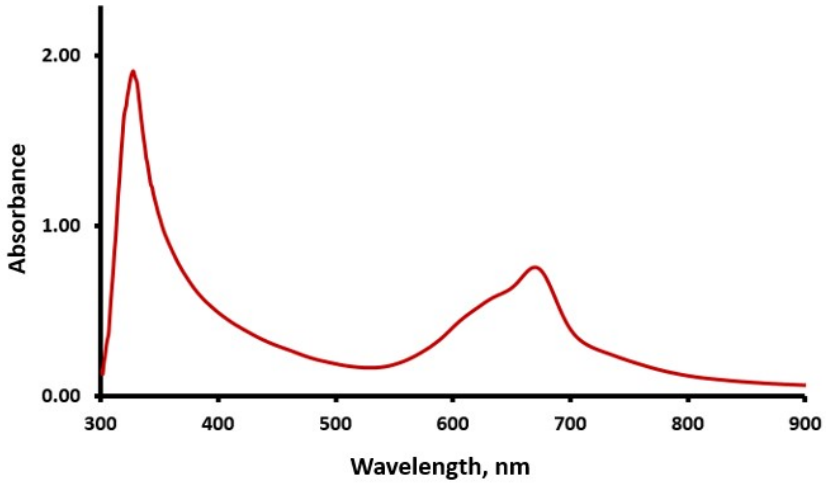
SM13 UV-vis spectrum of compound **2**.



SM14 FT-IR spectrum of compound **3**.



SM15 Mass Spectrum of compound **3**.



SM16 UV-vis spectrum of compound **3**.

References

1. Manjunatha, N., M. Hojamberdiev, and L.K. Sannegowda, Journal of Energy Storage, 2022, 50, 104696.
2. W. Cheng, Y. Zhang, L. Zang, Z. Xu, Y. Zhang, Y. Zhao and L. Sun, Journal of Energy Storage, 2024, 102, 114043.
3. L. Mei, X. Cui, J. Wei, Q. Duan and Y. Li, Dyes and Pigments, 2021, 190, 109299.
4. Y. Chen, L. Tong, G. Lin and X Liu, Materials Chemistry and Physics, 2022, 277, 125433.
5. N. Koçyiğit, M. B. Arvas, S. Yazar, N. Açar-Selçuki, Y. Şahin, M. Özer and Ö. Bekaroğlu, Synthetic Metals, 2023, 292, 117242.
6. F. Qi, Y. Wang, J. Xu, X. Wang, J. Wang, H. Shan, M. Li, J. Xu, Synthetic Metals, 2023, 293, 117284.
7. Y. Wang, M. Li, R. Ramachandran, H. Shan, Q. Chen, A. Luo, F. Wang, Z.-X. Xu, Journal of Energy Chemistry, 2023, 76, 214-225.
8. Y. Lu, X. Pang, M. Li, M. Liang, W. Wang, Q. He, A. Q. Zarifzoda and F. Chen, ChemSusChem, 2025, 18(5), e202401940.
9. Mounesh, N. Y. Praveenkumar, T. M. Sharankumar, K. R. Venugopal Reddy, Electrochem Sci Adv, 2022, 2 (1), e2100006.