coatings

MDPI

Supplementary Materials

Hybrid Materials Based on ZnO Nanoparticles and Organo-Modified Silica Coatings as Eco-Friendly Anticorrosive Protection for Metallic Historic Artifacts

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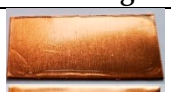
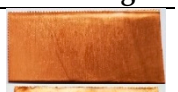
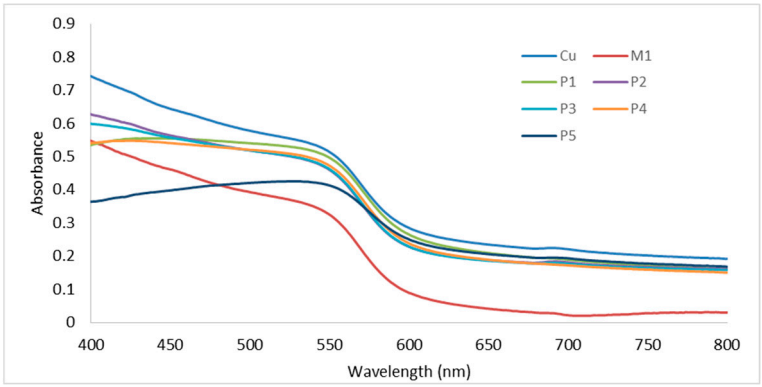
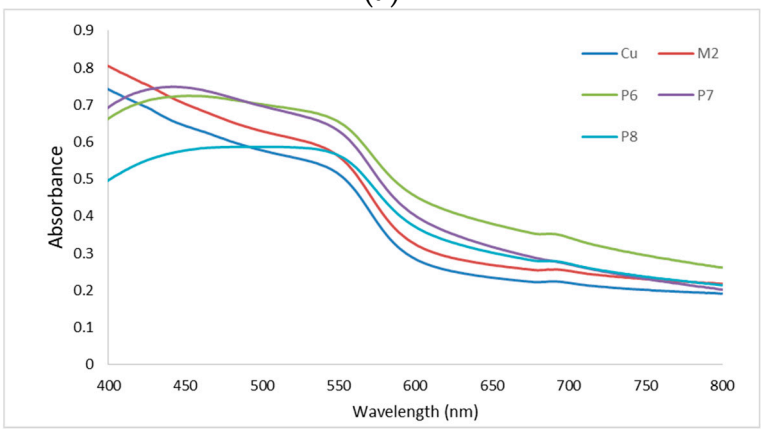
Sample	Coating	Sample	Coating	Sample	Coating
M1		M2		P9	
P1		P6		P10	
P2		P7		P11	
P3		P8		P12	
P4		-	-	P13	
-	-	-	-	P14	
-	-	-	-	P9	
-	-	-	-	P10	

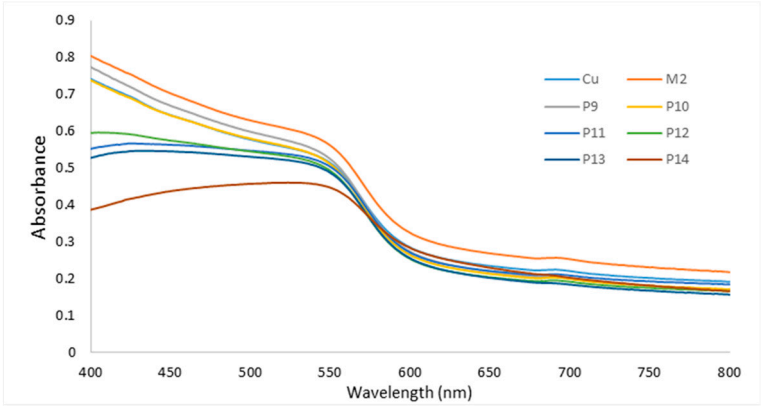
Figure S1. Optical images of Incralac-based and silica-based coatings.



(**a**)

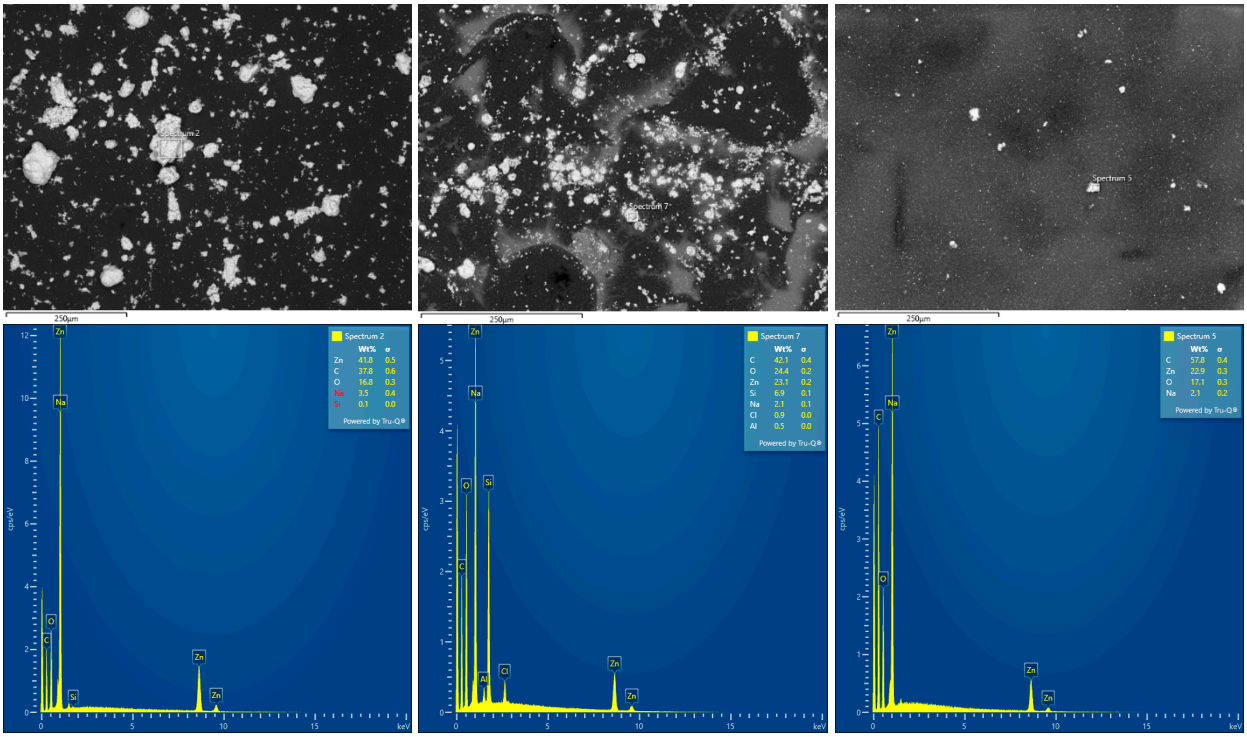


(**b**)



(**c**)

Figure S2. Diffuse reflectance spectra of Incralac-based and silica-based coatings with various compositions.



(a) (b) (c)

Figure S3. SEM images and EDX analysis for (a) ZnO nanopowder; (b) ZnO containing Incralac coating (sample P5) and (c) ZnO and BTA containing silica coating (sample P14).

Table S1. The chromatic coordinates ΔE*, L*, a* and b* determined for Incralac-based and silica-based coatings with various compositions.

Sample	ΔE*ab	ΔL*	Δa*	Δb*
M1	2.32 ± 0.06	-0.80 ± 1.01	1.69 ± 0.73	0.97 ± 0.58
P1	2.44 ± 0.39	-0.85 ± 0	1.76 ± 0	0.92 ± 0
P2	2.46 ± 0.19	0.92 ± 0.91	2.19 ± 0.16	0.08 ± 0.06
P3	3.67 ± 0.12	1.42 ± 0.21	3.21 ± 0.02	1.03 ± 0.09
P4	6.13 ± 0.29	-3.4 ± 0	4.09 ± 0	-2.61 ± 0
P5	12.54 ± 1.42	-1.29 ± 1.55	0.21 ± 1.75	-12.35 ± 1.63
M2	8.13 ± 0.21	-7.03 ± 0.24	1.92 ± 0.09	3.60 ± 0.07
P6	9.80 ± 0.19	-6.58 ± 0.28	-0.92 ± 0.09	-7.19 ± 0.50
P7	8.26 ± 1.17	-7.57 ± 1.33	1.09 ± 0.50	-3.06 ± 0.04
P8	9.16 ± 0.16	-3.13 ± 0.49	1.72 ± 0	-8.43 ± 0.01
P9	6.14 ± 0.24	-0.48 ± 0.07	3.08 ± 0.05	5.29 ± 0.31
P10	3.20 ± 0.33	-0.74 ± 0.05	1.90 ± 0.11	2.45 ± 0.50
P11	5.09 ± 0.43	-1.84 ± 0.16	3.26 ± 0.10	-3.44 ± 0.46
P12	7.51 ± 0.70	5.99 ± 0.61	1.17 ± 0.07	-4.37 ± 0.35
P13	6.48 ± 0.28	-3.62 ± 0.41	3.66 ± 0.02	-3.92 ± 0.12
P14	16.33 ± 0.40	-1.76 ± 0.29	-0.66 ± 0.72	-16.22 ± 0.41

Table S2. LSV and corrosion parameters (from Tafel) for bare and coated copper in 3.5% NaCl.

Sample	R_p (Ω)	$-E_{corr}$ (mV)	I_{corr} (μA/cm²)
Cu	844.5	332	21.52
M1	2976.0	297	4.754
M2	1041.0	294	10.800
P1	2104.0	280	4.011
P2	1264	267	2.362
P3	3149.0	257	2.259
P4	3230.0	289	3.860
P5	2351.0	284	3.015
P6	372.5	287	11.72
P7	927.0	273	13.320
P8	885.4	268	4.918
P9	1100.0	277	7.643
P10	982.9	283	7.193
P11	1364.0	280	5.844
P12	1573	282	3.823
P13	627.9	264	4.673
P14	1108	270	5.553