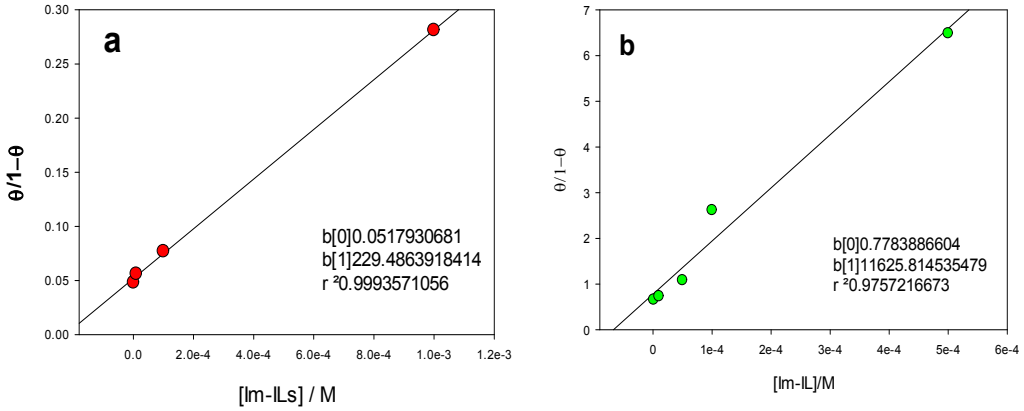
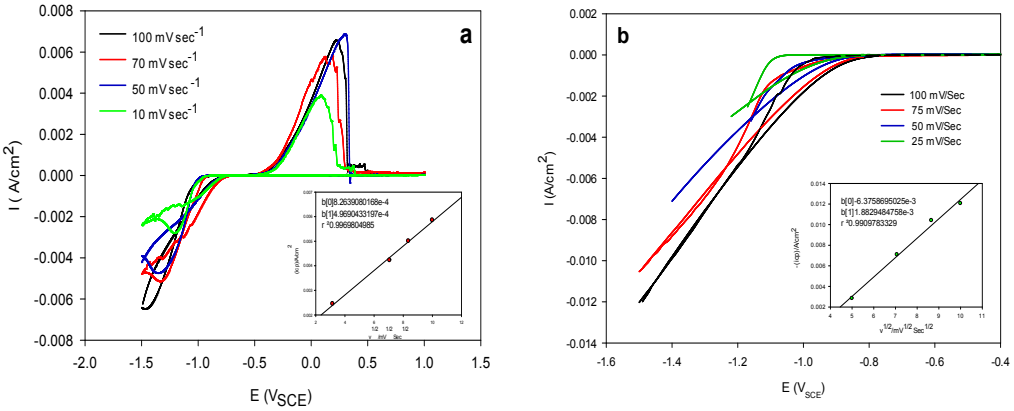
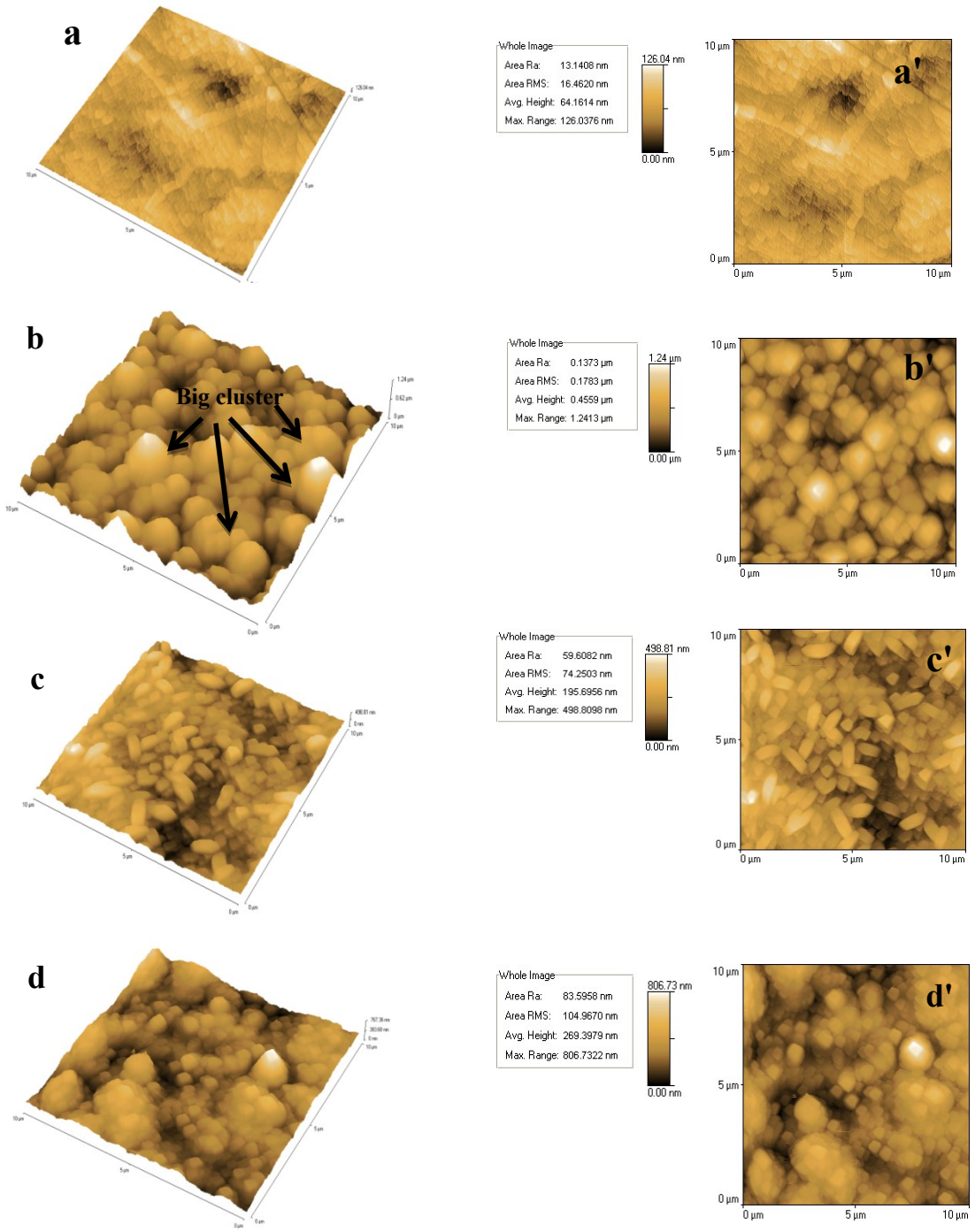
Electronic Supplementary Material (ESI) for RSC Advances.



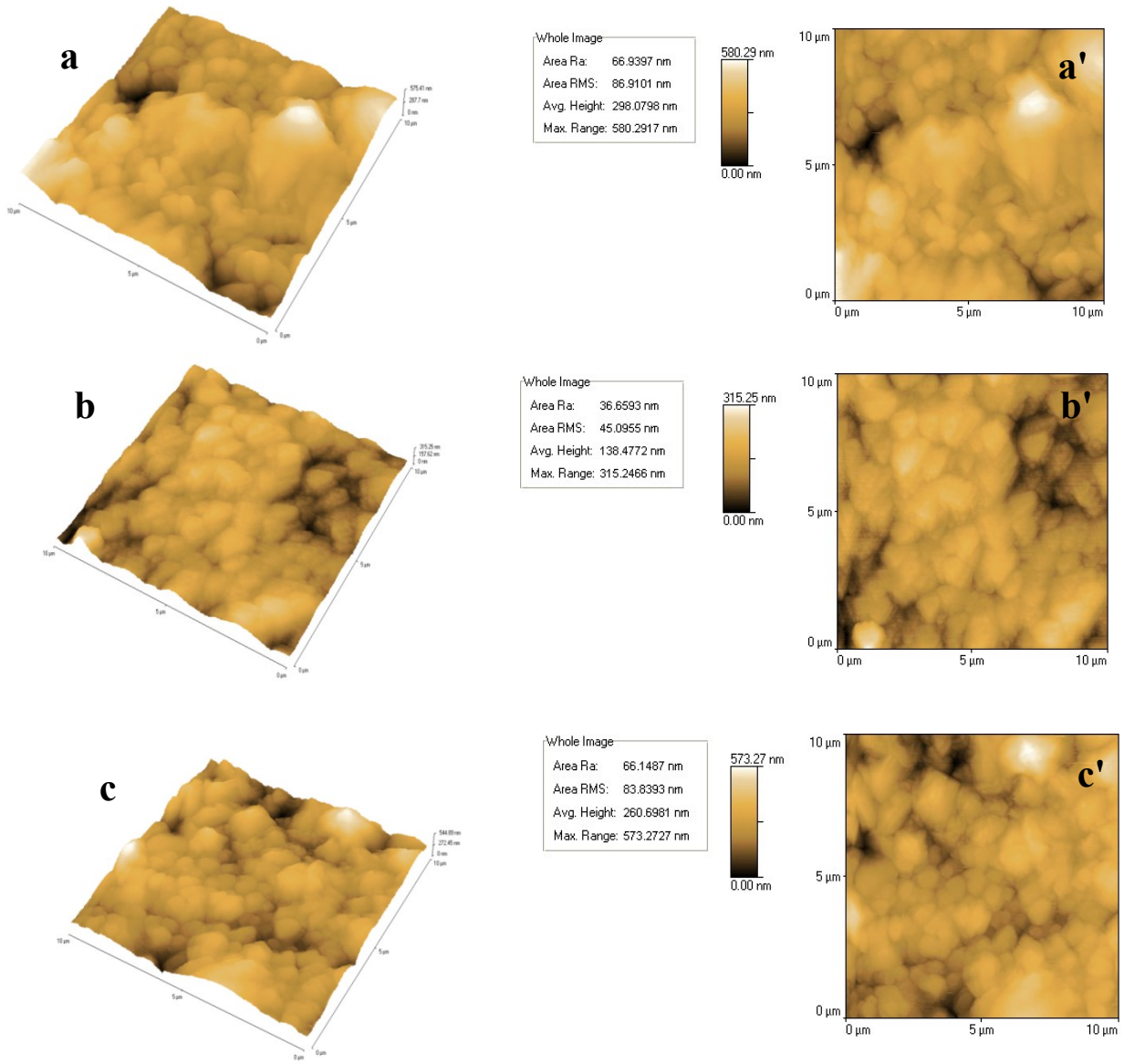
S1. Plot of θ/(1-θ) vs concentration of Im-IL: (a) Co (b) Ni electrodeposition.



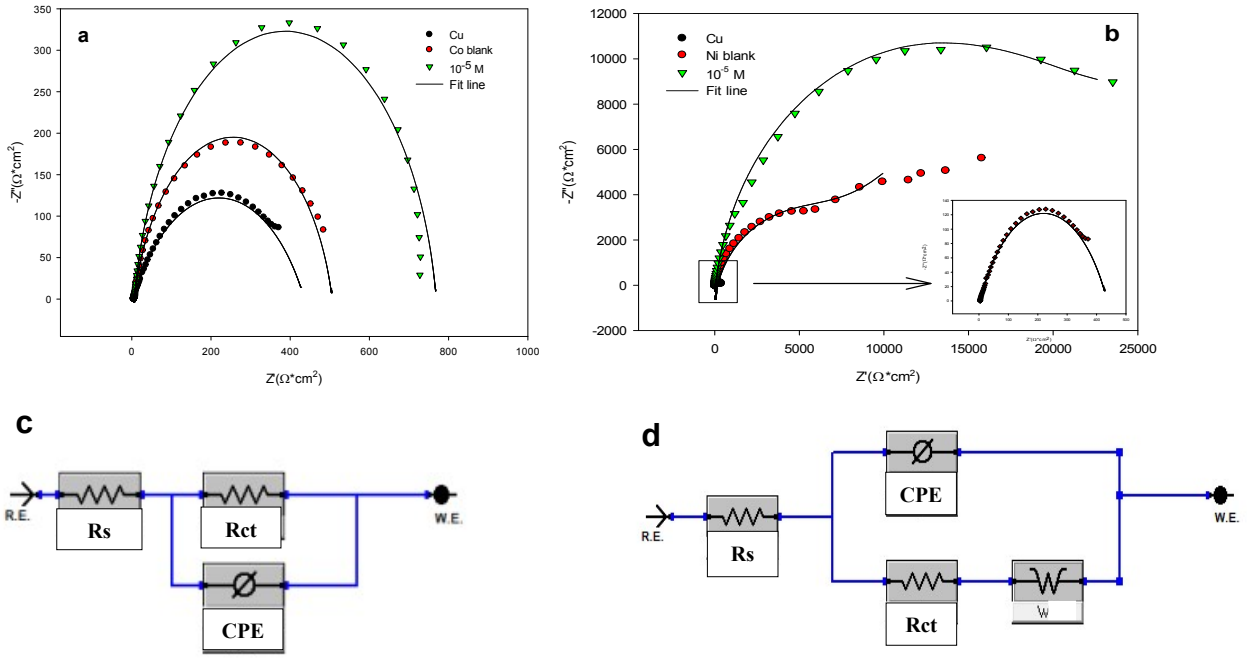
S2. CVs for (a) Co and (b) Ni electrodeposition at 1×10^{-5} M Im-IL recorded at GCE with different scan rates. Insert linear relation between cathodic peak current density (i_{cp}) as a function of the scan potential rate $v^{1/2}$.



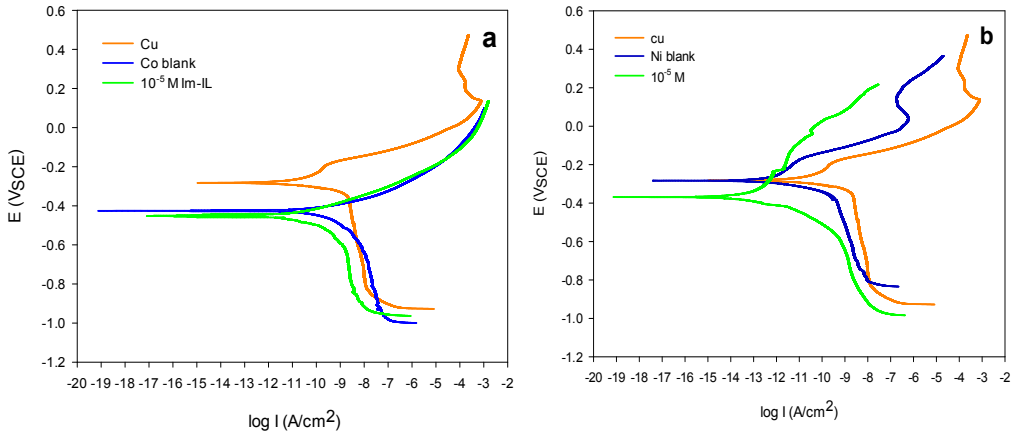
S3. AFM 3D, 2D images, of (a, a') pure copper (substrate), Co deposited from bath (b, b') free-Im-IL, (c, c') 1×10^{-5} M Im-IL, (d, d') 1×10^{-3} M Im-IL.



S4. AFM 3D, 2D images, of Ni deposited from bath (a, a') free-Im-IL, (b, b') 1×10^{-4} M Im-IL ,(c, c') 5×10^{-6} M Im-IL.



S5. Nyquist plots for Cu substrate (a) Co and (b) Ni deposits in 3.5% NaCl in the absence and presence of 1×10^{-5} M Im-IL. Equivalent circuit compatible with the experimental impedance data (c) Co, (d) Ni deposits.



S6. Potentiodynamic polarization curves for Co and Ni deposits in the absence and presence of 1×10^{-5} M Im-IL in 3.5% NaCl.

T1 CPP of Co and Ni electrodeposition at 2.0×10^{-3} mA.cm^{-2} in the absence and presence of different concentrations of Im-IL and θ by Im-IL at different concentrations.

[Im-IL] (M)	(CPP) Co V_{SCE}	θ (Co)	(CPP) Ni V_{SCE}	θ (Ni)
0.0	-0.82	-	-0.97	-
1.0×10^{-6}	-0.84	0.0481	-1.00	0.396
1.0×10^{-5}	-0.85	0.0531	-1.01	0.423
5.0×10^{-5}	-	-	-1.04	0.520
1.0×10^{-4}	-0.88	0.0714	-1.24	0.724
5.0×10^{-4}	-	-	-1.45	0.866
1.0×10^{-3}	-0.92	0.219	-	-

T2 NOP and the height of anodic current (i_a) peaks of ALSVs for Co and Ni electrodeposition in the absence and presence of different concentrations of Im-IL.

[Im-IL]/ M	NOP / mV (Co)	Height of i_a peek (Acm^{-2})	NOP / mV (Ni)	Height of i_a peek (Acm^{-2})
0	0.29	4.57×10^{-2}	0.52	4.17×10^{-4}
1×10^{-6}	0.32	3.84×10^{-2}	0.59	4.06×10^{-4}
1×10^{-5}	0.39	2.58×10^{-2}	0.62	3.40×10^{-4}
5×10^{-5}	-	-	0.66	1.66×10^{-4}
1×10^{-4}	0.4	1.08×10^{-2}	0.60	9.65×10^{-5}
5×10^{-4}	0.5	-	0.70	2.52×10^{-6}
1×10^{-3}	0.6	5.34×10^{-2}	-	-

T3 CCE%, Co and Ni deposits appearance under optimal bath conditions in absence and presence of different concentrations of Im-IL.

[Im-IL] (M)	CCE%		Deposition Appearance	
	(Co)	(Ni)	(Co)	(Ni)
0	99	99	Pale, hollow gray	Bright silver
5×10^{-7}	98	97	Pale gray	Bright silver with little tiny pits
1×10^{-6}	99	97	Pale gray	Bright silver with little tiny pits
5×10^{-6}	-	98	Pale gray	Bright silver with many small pits
1×10^{-5}	99.8	99	Bright gray	Bright silver with many small pits
5×10^{-5}	-	99.6	-	Very bright silver with very small pits
1×10^{-4}	99.5	99.8	Bright gray with little crack	Very bright silver with no pits
5×10^{-4}	-	103	-	Very bright silver with no pits
1×10^{-3}	104	-	Bright gray with more crack	-

T4 The results from impedance and polarization measurements in 3.5% NaCl and average microhardness for the both Co and Ni deposits with and without Im-IL at 25ºC.

	R_{ct} ($k\Omega \cdot cm^2$)	CPE ($k\Omega^{-1} S^n cm^{-2}$)	IE%	W ($k\Omega^{-1} S^{0.5} cm^{-2}$)	i_{corr} ($\mu A cm^{-2}$)	$-E_{corr}$ (mV_{SCE}) $\times 10^{-1}$	Average Hardness (H_{V100})
Cu	432.4	553.7×10^{-6}	-	-	2.84×10^{-5}	2.80	-
Co blank	500.1	318.4×10^{-6}	-	-	5.51×10^{-6}	4.26	342.5
$1x10^{-5}$ (M)	2184	1.109×10^{-4}	77.1	-	9.71×10^{-7}	4.52	368.5
Ni blank	7.26×10^{3}	181.9×10^{-6}	-	627×10^{-6}	6.36×10^{-6}	2.83	211.25
$1x10^{-5}$ (M)	22.3×10^{3}	122.8×10^{-6}	67.5	528×10^{-6}	3.21×10^{-6}	3.69	270