

## Article

# Mechanical Properties of Electrolytically Produced Copper Coatings Reinforced with Pigment Particles

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## Supplementary

The values of the composite and the calculated coating hardness by application of Chicot–Lesage composite hardness model (C–L CHM) for pure copper and various CuMC–PigP coatings

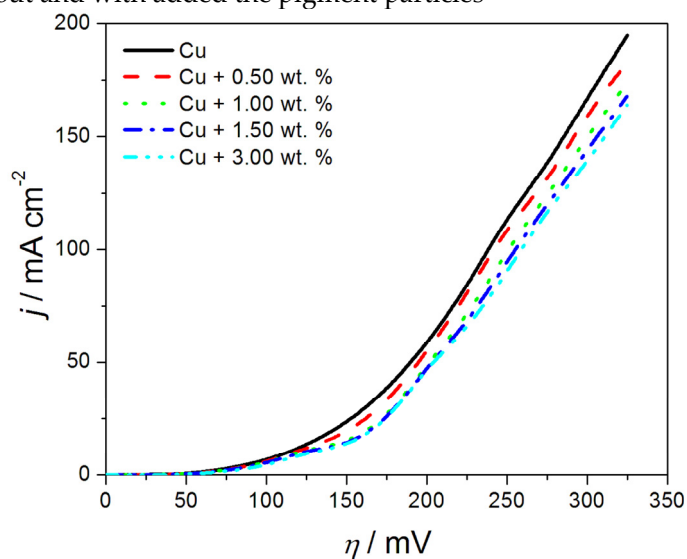
**Table S1.** The values of the composite,  $H_c$  and the coating hardness,  $H_{coat}$  calculated by application of C–L CHM for pure copper ( $c = 0$  wt %) and CuMC–PigP coatings with a concentration of the pigment particles of 0.50 and 1.00 wt %. RID – relative indentation depth;  $P$  – applied load.

$P / N$	$c = 0$ wt %			$c = 0.50$ wt %			$c = 1.00$ wt %		
	RID	$H_c / GPa$	$H_{coat}/GPa$	RID	$H_c / GPa$	$H_{coat}/GPa$	RID	$H_c / GPa$	$H_{coat}/GPa$
0.04903	0.121118	0.664156	0.71593	0.090588	0.782356	0.902283	0.068425	0.865619	1.027192
0.09806	0.15528	0.808145	0.78677	0.111933	1.024857	1.064553	0.086782	1.076262	1.143398
0.19612	0.20000	0.974289	0.910716	0.151261	1.122424	1.114832	0.115287	1.219692	1.236984
0.24515	0.224638	0.965367	0.877815	0.162437	1.216601	1.206067	0.126836	1.259614	1.267543
0.39224	0.266046	1.101199	1.014576	0.201681	1.262727	1.239769	0.158211	1.295293	1.289841
0.4903	0.287267	1.180636	1.106959	0.218487	1.344916	1.332017	0.17223	1.366266	1.362313
0.63739	0.322878	1.214939	1.139544	0.243697	1.405365	1.403703	0.186916	1.508002	1.520152
0.88254	0.383023	1.195394	1.09294	0.277983	1.49549	1.52391	0.216956	1.549817	1.578189
0.9806	0.402692	1.201635	1.097312	0.300504	1.421926	1.425183	0.228438	1.553262	1.585819
1.4709	0.485507	1.239988	1.134589	0.369748	1.408827	1.408492	0.284846	1.498479	1.531893
1.9612	0.563147	1.228865	1.101482	0.422689	1.437361	1.453339	0.323097	1.552902	1.615885
2.9418	0.672878	1.291119	1.189684	0.529412	1.374397	1.347113	0.400534	1.515736	1.577841

**Table S2.** The values of the composite,  $H_c$  and the coating hardness,  $H_{coat}$  calculated by application of C-L CHM for CuMC-PigP coatings with a concentration of the pigment particles of 1.50 and 3.00 wt %. RID – relative indentation depth;  $P$  – applied load.

$P / N$	$c = 1.50 \text{ wt } \%$			$c = 3.00 \text{ wt } \%$		
	RID	$H_c / \text{GPa}$	$H_{coat}/\text{GPa}$	RID	$H_c / \text{GPa}$	$H_{coat}/\text{GPa}$
0.04903	0.062032	0.952473	1.103057	0.05689	1.122424	1.224458
0.09806	0.08019	1.139896	1.202366	0.075853	1.262727	1.299895
0.19612	0.107937	1.258357	1.275661	0.104425	1.332545	1.342202
0.24515	0.117841	1.319641	1.327267	0.109671	1.510125	1.499015
0.39224	0.146032	1.374916	1.374664	0.136157	1.567619	1.564674
0.4903	0.153968	1.546032	1.550518	0.149368	1.628225	1.632369
0.63739	0.174794	1.559455	1.5728	0.166498	1.703545	1.723908
0.88254	0.200	1.649276	1.687658	0.192794	1.759198	1.810378
0.9806	0.209524	1.669721	1.718673	0.201643	1.78686	1.851994
1.4709	0.260317	1.62254	1.687999	0.246523	1.793221	1.905448
1.9612	0.303937	1.586993	1.659097	0.290771	1.718645	1.842582
2.9418	0.374667	1.566542	1.651889	0.362516	1.658541	1.796041

The cathodic polarization curves for copper electrodeposition from the electrolytes without and with added the pigment particles



**Figure S1.** The cathodic polarization curves for Cu electrodeposition recorded from the pigment-free electrolyte, and from electrolytes with an addition of the pigment particles.

The working electrode (cathode): brass; The counter electrode (anode): copper; reference electrode: copper.

The electrolyte stirring: magnetic stirring (100 rpm).

Temperature: the room temperature.