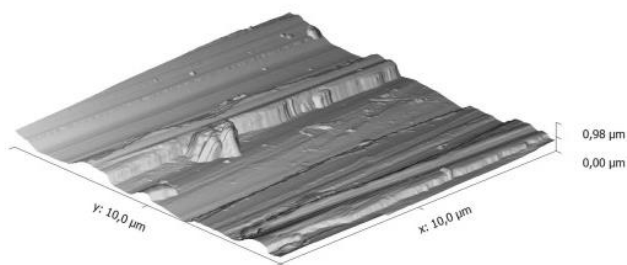
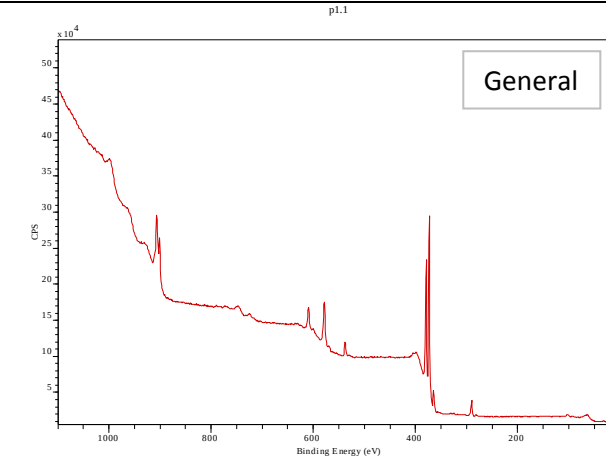
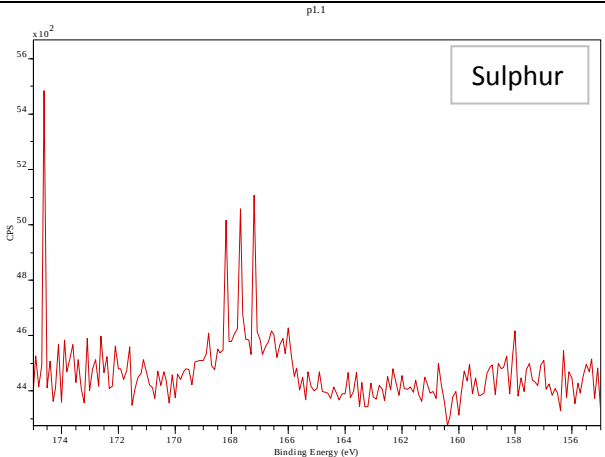
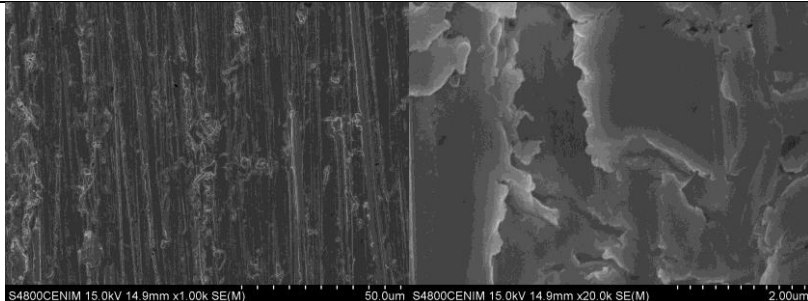
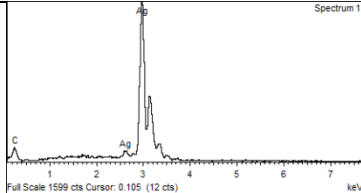
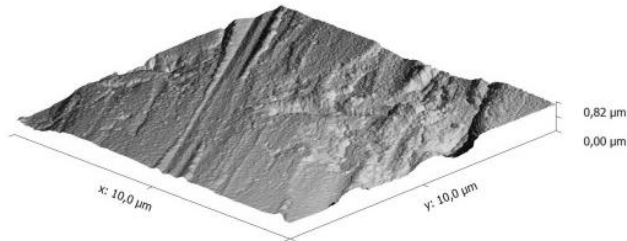
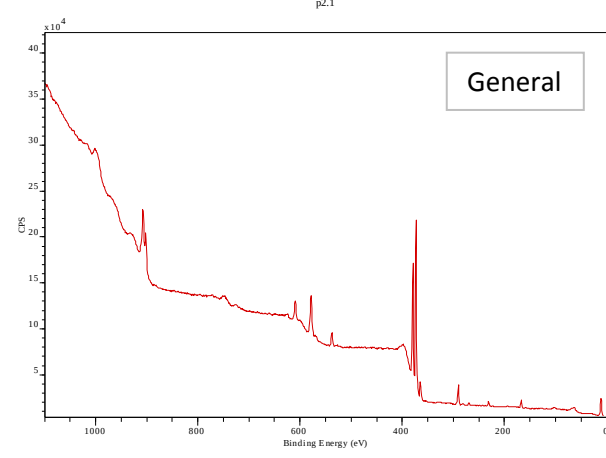
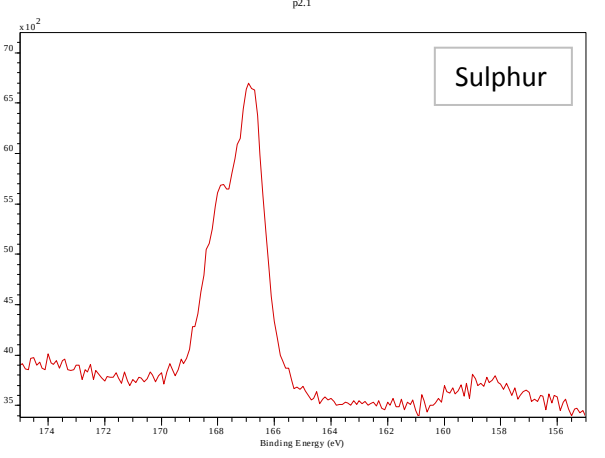
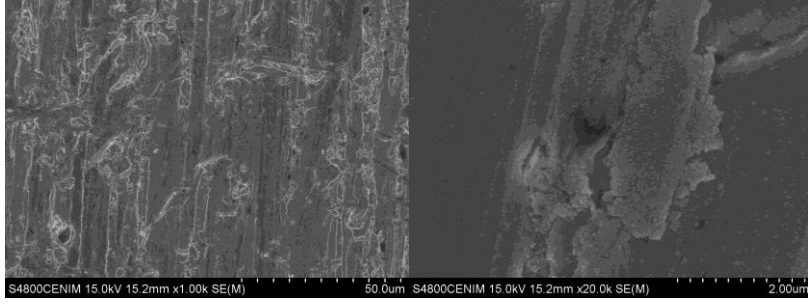
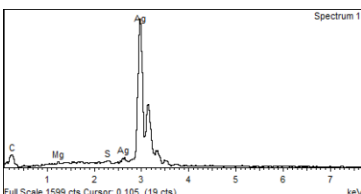
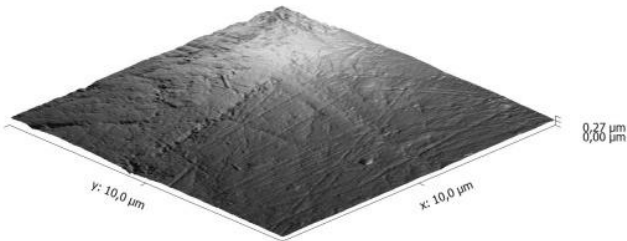
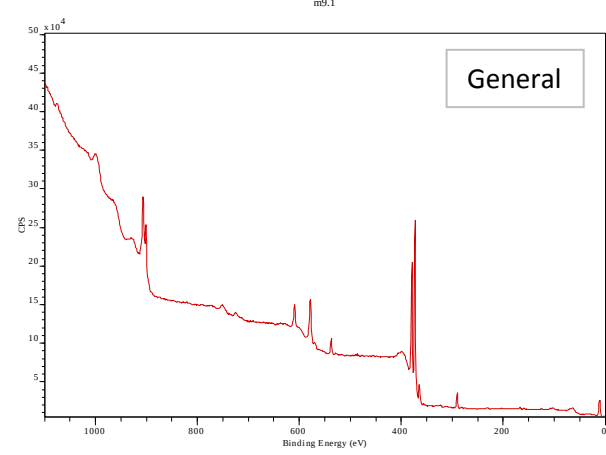
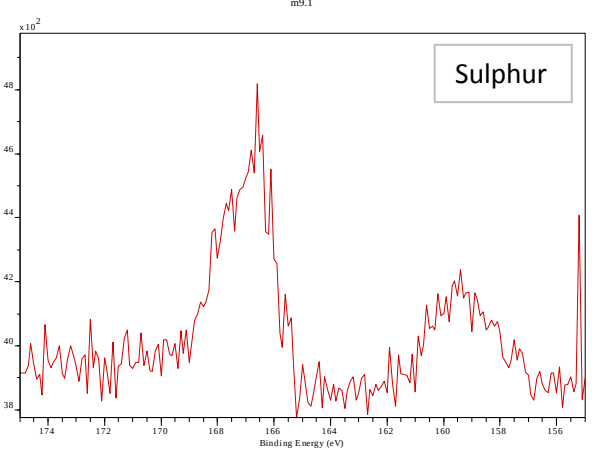
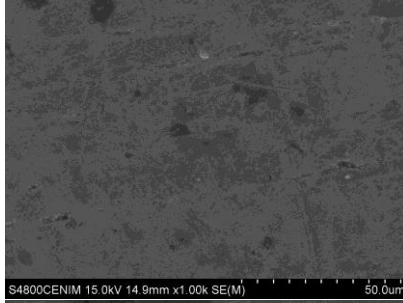
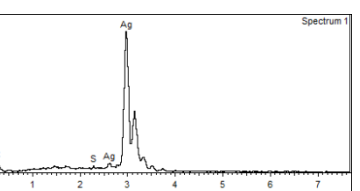
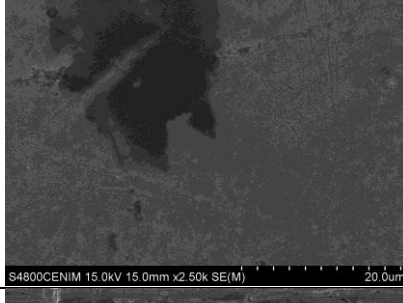
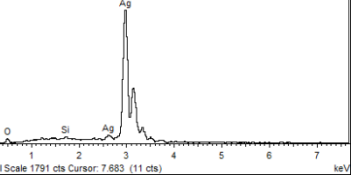
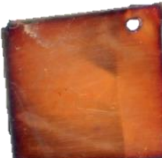
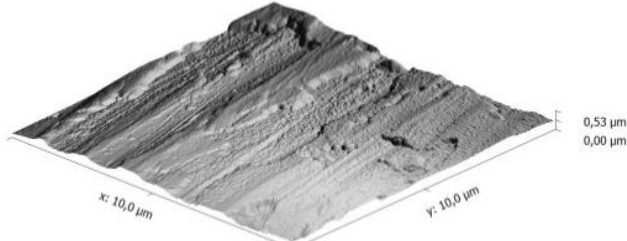
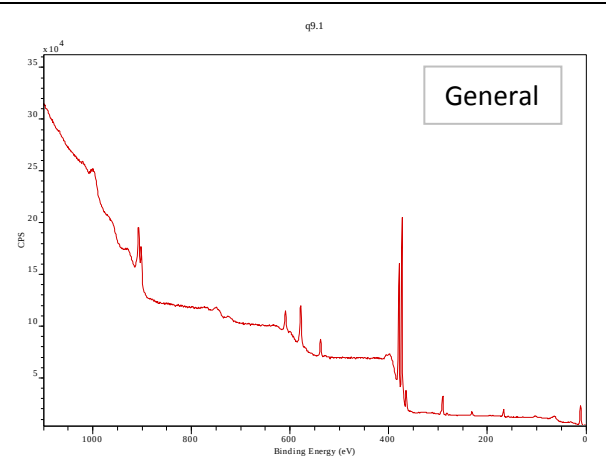
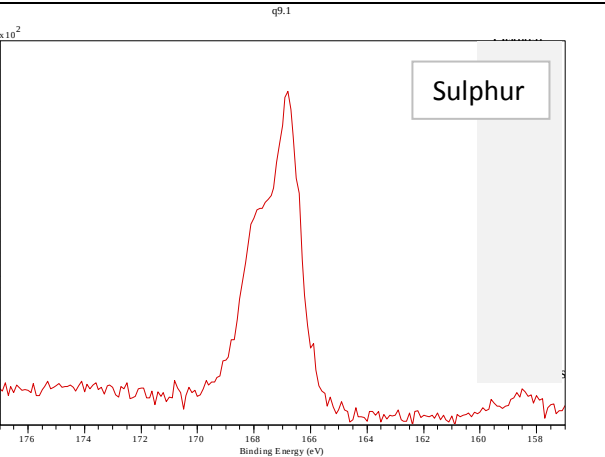
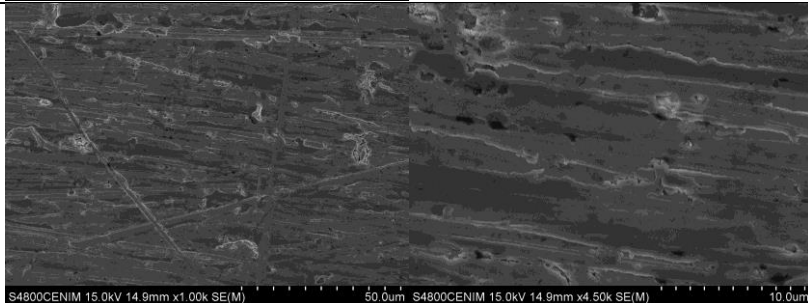
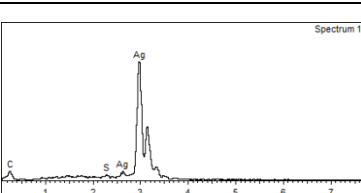
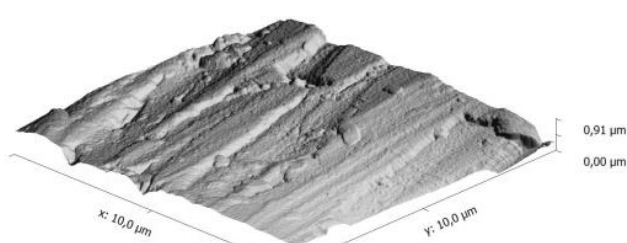
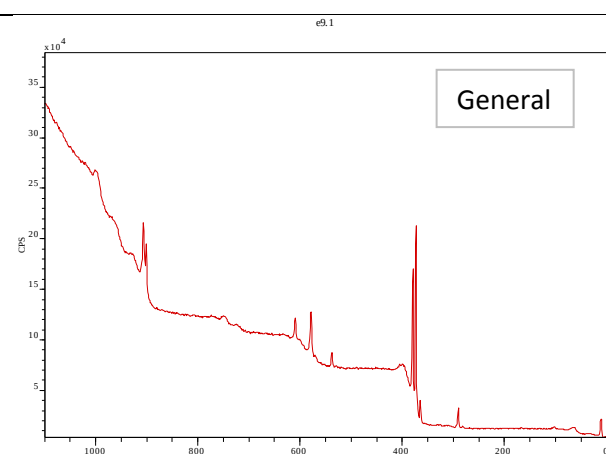
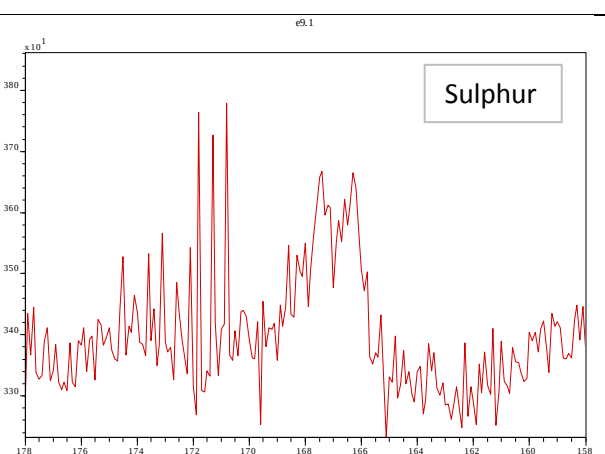
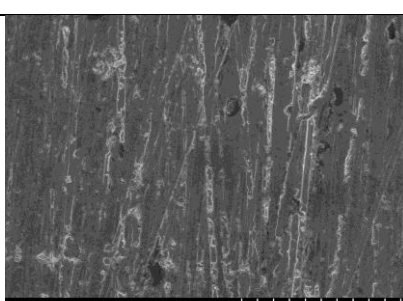
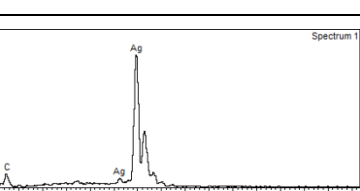


Quantitative evaluation of the effect of electrochemical cleaning of silver artefacts

Coupon	AFM		XPS		SEM/EDX																	
P1 silver reference 		Statistical Quantities Average value: 334,9 nm Minimum: 0,0 nm Maximum: 976,2 nm Median: 277,2 nm Ra: 139,4 nm Rms:167,5 nm Rms (grain-wise): 167,5 nm Skew: 0,818 Kurtosis: 0,00477 Surface area: 111,1361 μm^2 Projected area: 100,0000 μm^2 Inclination θ: 2,2 deg Inclination φ: -114,2 deg	 	  <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>17.25</td></tr><tr><td>Ag L</td><td>82.75</td></tr></table>	Element	Atomic%	C K	17.25	Ag L	82.75												
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C K	17.25																					
Ag L	82.75																					
P2 tarnished silver reference  Treatment: 3 min. immersion in a 0.001% w/v Na₂S solution		Statistical Quantities Average value: 534,4 nm Minimum: 0,0 nm Maximum: 821,1 nm Median: 549,5 nm Ra: 72,0 nm Rms: 94,2 nm Rms (grain-wise): 94,2 nm Skew: -0,215 Kurtosis: 1,12 Surface area: 109,4553 μm^2 Projected area: 100,0000 μm^2 Inclination θ: 0,7 deg Inclination φ: 108,1 deg	 	  <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>19.49</td></tr><tr><td>Mg K</td><td>2.02</td></tr><tr><td>S K</td><td>1.44</td></tr><tr><td>Ag L</td><td>77.05</td></tr></table>	Element	Atomic%	C K	19.49	Mg K	2.02	S K	1.44	Ag L	77.05								
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M9 Mechanical cleaning  Treatment: tarnishing followed by Pre-lim[®] surface cleaner (Picreator Enterprises Ltd.) applied with cotton swabs and removed with deionized water/ethanol 50% v/v. (5 cycles of tarnishing-cleaning) Mass loss: 0.33 mg		Statistical Quantities Average value: 281,6 nm Minimum: 0,0 nm Maximum: 402,6 nm Median: 296,7 nm Ra: 56,6 nm Rms: 68,8 nm Rms (grain-wise): 68,8 nm Skew: -0,93 Kurtosis: 0,269 Surface area: 102,3066 μm^2 Projected area: 100,0000 μm^2 Inclination θ: 1,0 deg Inclination φ: -107,3 deg	 	  <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>15.45</td></tr><tr><td>S K</td><td>0.64</td></tr><tr><td>Ag L</td><td>83.91</td></tr></table>   <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>52.54</td></tr><tr><td>O K</td><td>15.59</td></tr><tr><td>Si K</td><td>0.45</td></tr><tr><td>Ag L</td><td>31.43</td></tr></table>	Element	Atomic%	C K	15.45	S K	0.64	Ag L	83.91	Element	Atomic%	C K	52.54	O K	15.59	Si K	0.45	Ag L	31.43
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Q9 Chemical cleaning  Treatment: : tarnishing followed by 1 h immersion in a solution of 10% DTPA pentasodium salt C₁₄H₁₈N₃Na₅O₁₀.xH₂O + 1.5% v/v Triton X-100. (5 cycles of tarnishing-cleaning) Mass loss: 0.01 mg		Statistical Quantities Average value: 241,7 nm Minimum: 0,0 nm Maximum: 530,1 nm Median: 236,5 nm Ra: 61,9 nm Rms: 80,4 nm Rms (grain-wise): 80,4 nm Skew: 0,238 Kurtosis: 0,393 Surface area: 108,5944 μm^2 Projected area:100,0000 μm^2 Inclination θ: 0,2 deg Inclination φ: -174,9 deg	 	  <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>18.11</td></tr><tr><td>S K</td><td>1.58</td></tr><tr><td>Ag L</td><td>80.31</td></tr></table>	Element	Atomic%	C K	18.11	S K	1.58	Ag L	80.31										
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C K	18.11																					
S K	1.58																					
Ag L	80.31																					
E9 Electrochemical cleaning  Treatment: : tarnishing followed by Potentiostatic reduction with a Gamry Ref 600, -1 V Ag-AgCl₂, 2120 sec, using NaNO₃ 0.1M as electrolyte. (5 cycles of tarnishing-cleaning) Mass loss: 0.05 mg		Statistical Quantities Average value: 592,7 nm Minimum: 0,0 nm Maximum: 908,1 nm Median: 614,0 nm Ra: 93,7 nm Rms: 123,1 nm Rms (grain-wise): 123,1 nm Skew: -0,913 Kurtosis: 1,87 Surface area: 109,0732 μm^2 Projected area: 100,0000 μm^2 Inclination θ: 1,4 deg Inclination φ: 22,0 deg	 	  <table><tr><th>Element</th><th>Atomic%</th></tr><tr><td>C K</td><td>23.15</td></tr><tr><td>Ag L</td><td>76.85</td></tr></table>	Element	Atomic%	C K	23.15	Ag L	76.85												
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