Type of presentation: Poster

ID-7-P-3472 Electrochemistry of copper on modified fibre and polymers – a dialogue between science and fine arts

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Scientific investigations of historical electrochemical plating technologies as an artistic method to generate pictures on carbon coated fibrous and polymeric substrates were recently initiated. It is possible to vary the composition and nature of substrates, such as papers, textiles and polymeric surfaces. As a model system for this process served thick art paper and powdered carbon as conductive agent. The working electrode consisted of a carbon rod contacting the graphitized substrate by the cylindrical edge face. As counter electrode served a Cu bar contacting the opposite edge of the substrate laterally. The reference electrode, a Ag/AgCl electrode, could be moved to at any location above the substrate. Thus, an electric potential field mapping on the graphitized substrates could be achieved. In the course of a galvanic process in an electrolytic bath, copper atoms precipitated laterally inhomogeneously on a sheet of paper coated with adherent graphite powder. This process is inherently stochastic and can only be controlled to a limited degree. Further, a potentiostatic three electrode set up was employed which allowed the exact identification of the working electrode versus the known reference electrode. Within the parameters of the experiment, structural variations of copper morphology can be influenced by changing the voltage between working and counter electrode, applying a pulsed current instead of DC, modifying the surface texture of the substrate or by adding a brightening agent. To demonstrate the underlying mechanistic growth principles, samples are subsequently examined under the scanning electron microscope. The surface structure of the deposited copper and the nature of the various oxidic and salt coatings (Cu_2O, CuO, $CuSO_4$, $CuCl$, etc.) primarily determined the colour range of the images. The role of the oxidation of the surface and the detectable copper compounds needs to be investigated further.

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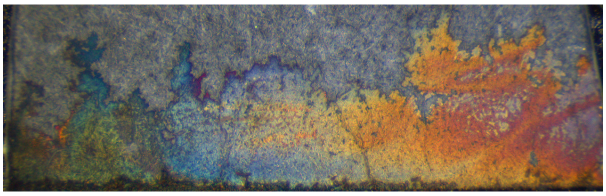

Fig. 1: DC deposited copper on carbon coated paper (40x mag.)

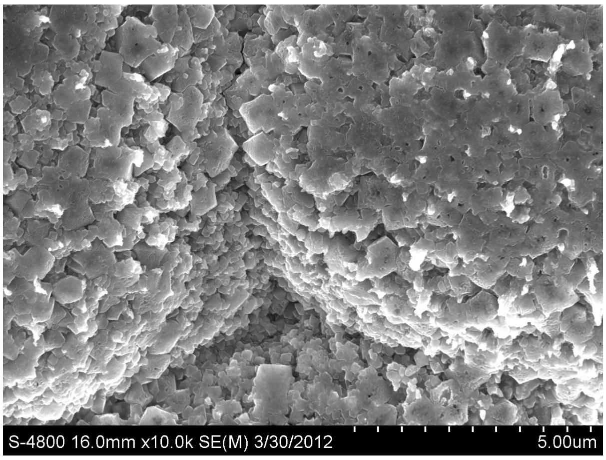

Fig. 2: DC deposited copper on carbon coated paper (10000x mag.)

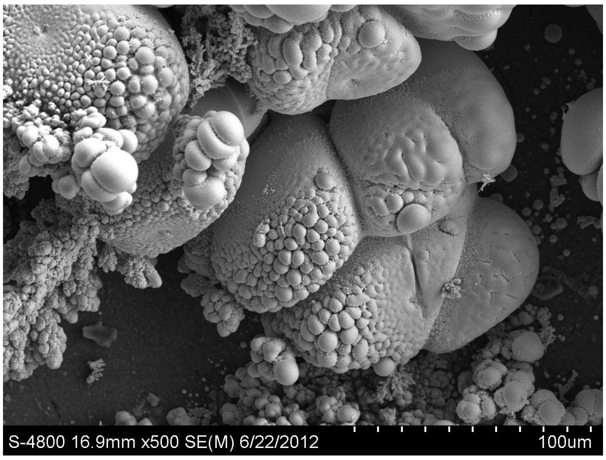

Fig. 3: Deposited copper on FloppyDisk (500x mag.)

Fig. 4: Deposited copper on FloppyDisk (5000x mag.)