The study of a coating based on carboxylate compounds as protection for lead or lead alloyed metal objects

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From the 19th century on, 15th through 17th century organs in churches all over Europe began to lose their specific sound due to corrosion caused by the increase of humidity, temperature, and the presence of organic acids in the ambient atmosphere [1]. Efforts to protect lead-based or lead alloyed artefacts against corrosion can involve two approaches: (1) reduce the corrosive substances in the ambient environment and/or (2) apply a surface protection treatment by developing a coating using corrosion inhibitors. The used inhibitors should be stable, reversible, inexpensive and should be able to produce an aesthetically suitable coating.

Our approach makes use of carboxylic acid inhibitors, which are composed of a polar hydrophilic group and a non-polar hydrophobic group. These inhibitors have many advantages compared to other organic compounds, such as high inhibition efficiency, low price, low toxicity, easy production and simple deposition [2-3]. In a first study sodium dodecanoate, was used to deposit a coating using two different deposition methods: by immersion using a reduction pre-treatment of the lead surface and by cyclic voltammetry [4-5]. In a very recent study, a neutralised dimerised fatty acid was deposited using the immersion method and spin coating.

The corrosion inhibition properties of the coating layers in all cases have been examined using potentiodynamic polarisation curves and electrochemical impedance measurements in a corrosive environment. Here we discuss the outcome of these results.

References

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