Electrochemical study of (lead bronze) alloy in \(7.5\%\) NaCl Solution and testing two protective coatings, applied on some Coins from Ptolemaic Period.

Abstract:
The Electrochemical Measurements were performed on blank samples from pure copper, lead/tin and lead bronze alloys with different compositions from tin and lead, and treated samples by Paraloid B\(^{28}\) and Benzotriazole (BTA) in NaCl \(7.5\%\) solution, using electrochemical cell of \(100\) ml capacity, with an apparatus Model \(254/253\) corrosion Analysis software, V.4.3.

The results showed that galvanic coupling effect plays an important role in the system of metallic dissolution. The dissolution rate of metallic ions from lead bronze alloy (\(5\%\)Pb + \(5\%\)Sn) was faster than dissolution of lead bronze alloy (\(7.5\%\) Pb + \(7.5\%\) Sn) or pure copper.

The dissolution increased with increasing of (Pb, Sn) content and other impurities in the alloy.

The polarization curves showed that the corrosion current was increased by increasing the lead content in the samples.

The electrochemical measurements showed that the treated sample by Paraloid B\(^{28}\) lowered the Anodic and Cathodic current density, and gave an inhibition rate of \(28.89\%\). While the samples which was treated by BTA gave an inhibition rate of \(26.89\%\).

The examination by metallographic microscope and scanning electron microscope are confirmed the results of the electrochemical measurements.

Finally, these results helped us in treatment and conservation of some coins from north Sinai, Egypt, after using a serial of examinations and analyses by using metallographic microscope, SEM, XRD and XRF.