

# ELECTRO DEPOSITION OF COPPER ON THE MILD STEEL SUBSTRATE AND INVESTIGATION OF ITS DIFFERENT PROPERTIES

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**Abstract**—Electrodeposition of copper onto mild steel substrates is a versatile technique for modifying surface properties. This research investigates the influence of bath composition on the current efficiency, microhardness and morphological properties of the deposited copper layer. We explore the impact of varying concentrations of each bath constituent on these aspects to optimize the deposition process. We found the highest current efficiency and lowest microhardness when we used the highest concentrations of Copper Sulphate. We also observed the current efficiency and microhardness for different concentrations of Sodium Chloride, Sulphuric acid, and PEG. We obtained the highest current efficiency and microhardness when we used the lowest concentrations of Sodium Chloride, Sulphuric acid, and PEG. The surface morphology of the deposited copper is analyzed using scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDX). SEM analysis is expected to reveal the morphology of the copper film, while EDX will confirm its elemental composition. The surface morphology of Cu-deposited mild steel reveals that the Cu particle is uniformly deposited and somewhere clusters are found. The deposition is also confirmed by EDX spectra where the atomic and weight percentage of Cu were found 95.42% and 84% respectively. This research aims to establish optimal deposition parameters for achieving the desired properties of electrodeposited copper on mild steel substrates.

**Keywords**— *Copper, Electro-deposition, Current Efficiency, Micro Hardness, SEM and EDX*