

Title:	Electroplating of Chromium from Cr (III) Aqueous Solutions on the Mild Steel: Optimization of Bath Constituents
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Abstract:

The investigation was aimed to electro depositing chromium on mild steel surface from non-toxic trivalent chromium bath instead of toxic hexavalent chromium employed for this purpose. The effects of bath constituents on the current efficiency, deposition rate, micro hardness, and optical reflectivity of Cr (III) plated mild steel were studied. The results revealed that the current efficiency and deposition rate increased linearly but micro hardness and optical reflectivity decreased gradually with the rise of chromium (III) chloride concentration. Completely reversed effects were observed when organic additive polyethylene glycol (PEG) and complexing agent (HCOOH) were added in to the plating bath. However, sodium sulfate produced a nonlinear relationship with current efficiency and hardness, but the optical reflectivity decreased linearly with the increased of Na₂SO₄ concentration. SEM and EDX results showed smooth deposition of chromium when the bath contained a lower amount of Cr^{3+} .

