

Table 6.4.2 E: Nanocrystalline Co-P Process Data Summary Compared to Hard Chromium Electroplating (McCrea et al. 2003)

Factor	Nano Co-P Alloy	Hard Chrome
Bath Chemistry	Co 2-twt%P (CoCl ₂ /H ₃ PO ₄ /H ₃ PO ₃)	Cr (CrO ₃ /So ₄ ⁻²)
Efficiency	85-95%	15-35%
Deposition Rate	Up to 8 mil/hr	Up to 1.6 mil/hr
Thickness	Demonstrated up to 0.020"	Typically <0.005"
As-deposited Appearance	Pit/Pore Free	Microcracked
Microstructure	Nanocrystalline	----
Relative Process Cost	1.3	1.0
Emission Analysis	Below OSHA limits	Cr ⁺⁶