Electrodeposited Nanocrystalline Cobalt-Iron Alloys As an Environmentally Benign Replacement to Hard Chrome Plating

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Electrodeposited nanocrystalline cobalt-iron alloy coatings have been investigated as a potential hard chrome replacement system. Via extreme grain refinement (3nm to 100nm average grain size) and Hall-Petch strengthening, hard nanocrystalline coatings can be produced that meet or exceed the hardness and wear performance of current hard chromium plating technologies. The mechanical properties (micro-hardness, wear, etc.) of electrodeposited nanocrystalline cobalt-iron alloys will be discussed, and where possible, correlated with the structure, composition and average grain size of the alloy.

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