

Ni- Alloy Plating as an Alternative to Hexavalent Chromium Plating

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Electroplated hexavalent chromium coatings have been used for several decades in many technical applications since it was invented by G.J. Sargent in 1920. Because of the environmental problems and health risks associated with the use of hexavalent chromium, there has been an extensive search for alternative coatings with properties such as corrosion resistance and wear resistance, at a reasonable cost. However there is no single substitute that meets all the desirable performance characteristics of chromium.

Advanced techniques, such as alloy plating, electroless plating, trivalent chromium plating, plasma and thermal spray coating, PVD and ion implantation, have been applied for replacing hexavalent chromium plating.

Nickel alloy plating processes, such as Ni-P, Ni-B, Ni-P-B, Ni-W, Ni-Mo, Ni-W-B, Ni-P-B, Ni-W, Ni-Mo, Ni-W-B, Ni-Co-B, and Ni-alloy codeposited with hard ceramic particles or PTFE powder, have shown to be important candidates for the replacement processes of conventional hard chromium electroplating. Characteristics of various kinds of Ni-alloy plating including corrosion resistance and wear resistance are reviewed on the point of alternatives to chromium. Some of Ni-alloys are comparable to chromium in hardness and wear resistance and superior to more than 100 times in corrosion resistance.

This presentation will include an overview of toxicity of hexavalent chromium as well as the possibility of replacing the hexavalent chromium by means of the Ni-alloy plating.

- (1) E. W. Brooman, Metal Finishing, 98(7),38 (2000)
- (2) D. V. Schiffelbein, Proc. 79th AESF Conf. (American Electroplaters and Surface Finishers Society Inc.,Atlanta, Geogia, USA, June, 1992) p.1125
- (3) S. C. Kwon, etc., J. Kor. Inst. Surf. Eng. 36(1), 48 (2003)
- (4) T. Omi, M.Nakamura and H.Yamamoto, J. Surf. Finsh. Soc. of Jap., 39(12), 809 (1988)

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