

Physical Characterization of Chromium Composites Plated with Nano-powder Diamond

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1. 서론

Recently, many efforts have been made to investigate the composite plating in order to meet the requirements of both corrosion resistance and tribology. In this paper, the chromium nano-composite electroplating process and its properties were described.

2. 본론

Sargent' and fluoride baths were selected for chromium plating. Ultradispersed diamond (UDD) supplied by KT S&P Inc. (Korea) in the form of colloidal suspension was used as a source of diamond powders (size of 20-30 nm). Electroplating was carried out in the bath with automatic temperature control and magnetic stirring and lead-tin alloy was used as an anode.

3. 결과

The chromium nano-composite deposit was formed from two baths. The appearance of deposit included with nano-powders was nearly similar with that of pure chromium deposit. It changed from grey, matte, milky white to bright color depending on current density and temperature. The micro hardness of nano-composite deposit varied in the range of 800-940 HV (load: 25 g/f), similar with that of pure chromium plating. However, the wear resistance of nano-composite deposit was increased considerably. When the chromium nano composite was formed with the application of 20 A/dm² at of 40oC, the average height of abrasive tracks was only 3.5 μm compared with 9 μm for the pure chromium deposit. (revolution r=500, ruby ball diameter=1mm) On the other hand, when the applied current densities were 60 A/dm² and 25 A/dm² at 50oC, the wear depth of these deposits were 3.4 and 7.5 μm, respectively. Microscopic observation indicated that nano-diamond powders were included in the chromium deposit, however, it needs to be confirmed quantitatively.

참고문헌

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