

**복합 도금 2. 복합 도금의 기계적 성질**  
**Composite plating 2. The study of mechanical property by composite plating**

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Composite electroplating is a method allowing co-depositing fine particles of metallic or non metallic compounds into the plated layers in order to improve the surface properties.

The production of nanocomposite films can be achieved through electrochemical deposition of the matrix material from a solution containing suspended particles such as: oxides, carbides, nitrides, metal powder. This technique has been applied in the present work using nanometer size SiC particles for the production of the composite coatings. The aim of the present work was to compare the performance of pure nickel and Ni<sup>2+</sup>/WC, ZrO<sub>2</sub>, SiC, CNF, CNT, WC(Co) structured composite coatings as far as microhardness, wear and abrasion resistance were concerned. The characteristics of the coatings were assessed by scanning electron microscopy, micro hardness test, and wear test measurements. The results obtained in this study indicate that the co-deposition of nickel and WC, ZrO<sub>2</sub>, SiC, CNF, CNT, WC(Co) nano-particles leads to uniform deposits possessing better abrasion, wear property. The reports on mechanical properties of Ni composite deposits with WC, ZrO<sub>2</sub>, SiC, CNF, CNT, WC(Co) particles are limited. Due to their high wear resistance and the low cost of ceramic powder, Ni-WC, ZrO<sub>2</sub>, SiC, CNF, CNT, WC(Co) composites have been investigated to the greatest extent and successfully commercialized for the protection of friction parts. To achieve a combination of wear and heat resistance is relative various plating condition.

This table is showed various plating condition.

Table 1. The various powder condition of composition plating

Objective	Type	Size
Reference	WC	≐ 1 $\mu$ m
Other ceramics -1	SiC	≐ 1 $\mu$ m
Other ceramics -2	ZrO	≐ 1 $\mu$ m
Difference size -1	WC-2	≐ 2 $\mu$ m
Difference size-2	WC-4	≐ 4 $\mu$ m
Difference size-3	WC-8	≐ 8 $\mu$ m
Coating being	WC(Co)-1	≐ 1 $\mu$ m

Coating being	WC(Co) - 2	≐ 0.2 $\mu$ m
Solid Lubricant	CNF (Carbon nano fiber)	< 1 $\mu$ m
Solid Lubricant	CNT (Carbon nano tube)	< 0.1 $\mu$ m

**Reference**

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