

# ヒドラジンを還元剤とする無電解純ニッケルめっき膜の微細構造と電気伝導性

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## Microstructure and Electrical Conductivity of Electroless Pure Ni Plating Using Hydrazine as a Reducing Agent

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**概要** ヒドラジンを還元剤とする無電解純ニッケルめっき膜の電気伝導性および微細構造への浴組成の影響を明らかにした。膜中の不純物のうち、炭素、硫黄、ホウ素含有率を測定し、特に炭素は、0.01 mass% から0.19 mass% の範囲で大きな変化を示した。結晶構造は、断面TEM像により検討し、電子線回折結果から、析出膜の結晶方位は全般にランダムであることがわかった。また、結晶粒径は浴条件に応じて、10 nm から120 nm の間で変化し、ヒドラジン濃度が高い浴から析出した膜の結晶粒径は大きくなった。また、サッカリンを添加することでも結晶粒径は大きくなった。膜組成と結晶粒径との関係を整理した結果、膜中の炭素含有率と結晶粒径との関連性がみられた。一方、電気伝導性は、炭素含有率の増加とともに、直線的に低下することが明らかとなった。

### Abstract

The objective of this study is to clarify the effect of the composition of electroless pure Ni solutions on the microstructure and electrical conductivity of deposited films. The carbon, sulfur and boron contents included as impurities in the samples have been measured, showing changes in the carbon content ranging from 0.01 to 0.19% by mass. The crystal structure of the deposited films was investigated by means of cross-sectional TEM observation, and investigation of the obtained electron diffraction patterns reveals that the crystals of the deposited films are generally oriented randomly. The grain size is uniform throughout the investigated film (1  $\mu\text{m}$ ), though the diameter varies from 10 nm to 120 nm with changes in the solution composition: relatively coarse grains are observed in films deposited from a solution with a high hydrazine concentration. The addition of saccharin sodium generally induces grain growth. The results of the measurements suggest an adequate correlation between the carbon content and the grain size, and it has become evident that the electrical conductivity of the films decreases linearly with an increase of the carbon content.

**Key Words:** *Microstructure, Electrical Conductivity, Autocatalytic Ni plating, Grain Size, Transmission Electron Microscope*