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**Study on the Formation Mechanism of Hard Chrome Surface  
Morphology by Atomic Force Microscopy**

**AFM을 이용한 경질 크롬 도포층의 생성 기구 연구**

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**Abstract**

Atomic force microscopy was applied to study the formation and growth mechanism of thin chrome layers prepared under various pulse plating conditions. The chrome was electro-deposited from an electrolyte bath containing 250  $g/l$  of chromic acid, 25  $g/l$  of sulfuric acid using direct current density of 1.6  $mA.mm^{-2}$  and pulse currents with on-off time from 5 to 900 ms. The higher current density enhanced nucleation rate which resulted in refining grain size. The chrome growth kinetics determining nodule size and shape significantly depends on the duration of on-time rather than duration of off-time and on/off time ratio.