

國立高雄應用科技大學

化學工程系與材料工程系

產業研發碩士專班

碩士論文

銀/鈀三角奈米板催化化學鍍鎳浴之研究

Hollow Silver/Palladium Triangular

Nanoplate : A Novel Activator for

Electroless Nickel Deposition

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摘要

利用三角型銀奈米板當做模板與 Pd^{2+} 進伽凡尼置換反應 (galvanic displacement reaction) 可成功製備三角型銀/鈀奈米板，從型態觀察發現三角型銀/鈀奈米板為一中空奈米結構，計算中空三角型銀/鈀奈米板的平均邊殼厚度約為 16.5nm。並且利用石英震盪天平 (quartz crystal microgravimetry ; QCM) 進行電化學分析測試，測量結果顯示三角型 Ag/Pd 觸媒催化的沉積速率為 $1.33 \mu\text{g}/\text{cm}^2\text{s}$ 。這個結果意味著三角型銀/鈀奈米合金觸媒具有傑出的觸媒催化活性，可當作活化液成功應用在化學鍍鎳反應。

Abstract

Hollow Ag/Pd triangular nanoplates with uniform shells are successfully prepared by the galvanic displacement reaction, in which added Pd²⁺ ions react with Ag triangular nanoplates as templates. The morphology of the synthesized Ag/Pd nanostructures is observed to be that of regular triangular nanoplates with a hollow structure. The mean thickness of the side shells on hollow bimetallic nanoplates is found to be ~16.5nm. As supported by the analysis of electrochemical quartz crystal microgravimetry, the mean deposition rate catalyzed by the prepared Ag/Pd triangular nanoshells is measured to be $\sim 1.33 \mu\text{g} / \text{cm}^2 \cdot \text{s}$. The triangular alloy nanomaterials can be successfully used as activators and exhibit excellent activity in electroless nickel deposition.