

國立高雄應用科技大學
化學工程與材料工程學系
碩士論文

電化學製備自組裝奈米鈀球與催化化學鍍銅液
之研究

Self-assembled Pd Nanospheres: Electrochemical
preparation and their application as novel catalysts
in electroless copper deposition

研究生：吳榮彬 (Rong-Bing Wu)

指導老師：李建良 博士 (Chien-Liang Lee)

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摘要

我們發展一個簡單的電化學方法，以製備自組裝界孔奈米鈇球。本研究證明可以藉由調節氫離子(H^+)添加量，控制 PVP 練的空間排斥力，使小顆粒的奈米鈇粒子自組裝構成大的奈米鈇球。本研究結果發現，自組裝奈米鈇球的粒徑可以透過氫離子與 PVP 的濃度比(C_{H^+}/C_{PVP})及施加電流來控制，其粒徑大小隨著氫離子與 PVP 的濃度比(C_{H^+}/C_{PVP})增加而增加，亦隨著施加電流大小增加而增加。

此外，我們成功利用電化學法所製備出的自組裝奈米鈇球，作為化學鍍銅的活化觸媒，以石英震盪天平(QCM)量測其活性，結果指出化學鍍銅的沉積速率與催化活性，隨著自組裝奈米鈇球的粒徑減小而增加，並顯示出自組裝界孔奈米鈇球優異的化學鍍銅催化活性。

Abstract

A novel and simple approach to electrochemically prepare self-assembled Pd nanospheres with mesopores has been developed. This method demonstrates the assembling of Pd nanoparticles, forming larger Pd nanospheres, via the regulation of repulsion force from self-assembled nanospheres can be controlled by the concentration ratio of H^+ to PVP (C_{H^+}/C_{PVP}) and applied current. The diameters of the prepared Pd nanospheres increase with an increase on C_{H^+}/C_{PVP} and current. Additionally, the prepared Pd nanospheres are successfully used as catalysts for activating electroless copper deposition. The mesoporous nanospheres are found to have the excellent activity for electroless copper deposition.