催化劑電漿前處理對熱化學氣相沉積奈米碳管表面型態與場發射特性之影響

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摘 要

本實驗利用四氟化碳(CF4)及氮氣(N2)兩種氣體之電漿分別對鎳薄膜催化劑進行電漿前處理，以研究其對於所成長奈米碳管的表面形態及場發射特性之影響。本研究的奈米碳管是利用熱化學氣相沉積(thermal chemical vapor deposition)法來成長的。甲烷(CH4)氣體是主要的碳原子來源，而氬氣(Ar)則作為載氣使用。甲烷被觸媒熱分解來獲得碳原子，並從而成長出奈米碳管。我們使用拉曼光譜(Raman spectroscopy)、電子顯微鏡(SEM)、能量散佈分析儀(EDS)來分析經過電漿處理後的奈米碳管特性。從實驗數據得知，隨著電漿前處理時間的增大，所成長出的奈米碳管管徑會變小及碳管數目會變多，因而增強了奈米碳管的場發射特性。另外，從場發射的分析，經過CF4電漿處理4分鐘所成長的奈米碳管的場發射電流會達到1.67mA/cm2，而經過N2電漿處理4分鐘後場發射電流只有0.908 mA/cm 2。因此，使用CF4氣體電漿前處理會比N2氣體電漿前處理對奈米碳管場發射特性會有更顯著的增強效果。

關鍵詞 : 奈米碳管 ; 場發射 ; 熱化學氣相沉積

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