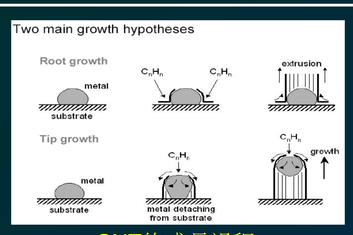
南臺科技大學
Southern Taiwan University of Science and Technology

半導體與光電工程系

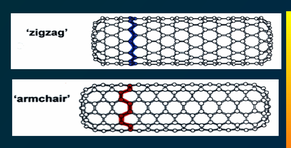
Department of Semiconductor and Electro-Optical Engineering

奈米碳管之發現與結構

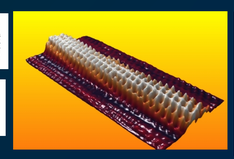
- 奈米碳管(Carbon Nano-Tube, CNT)於1991年由日本Ijima發現
- 奈米碳管有單壁(single wall)與多壁(multi-wall)的結構
- 奈米碳管的直徑約數奈米至數十奈米，長度可達數微米

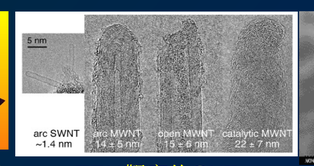


CNT的成長過程

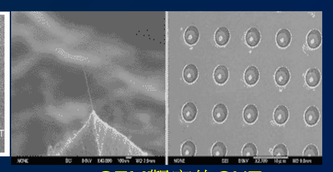


CNT的碳鏈結模擬結構


AFM觀察的CNT



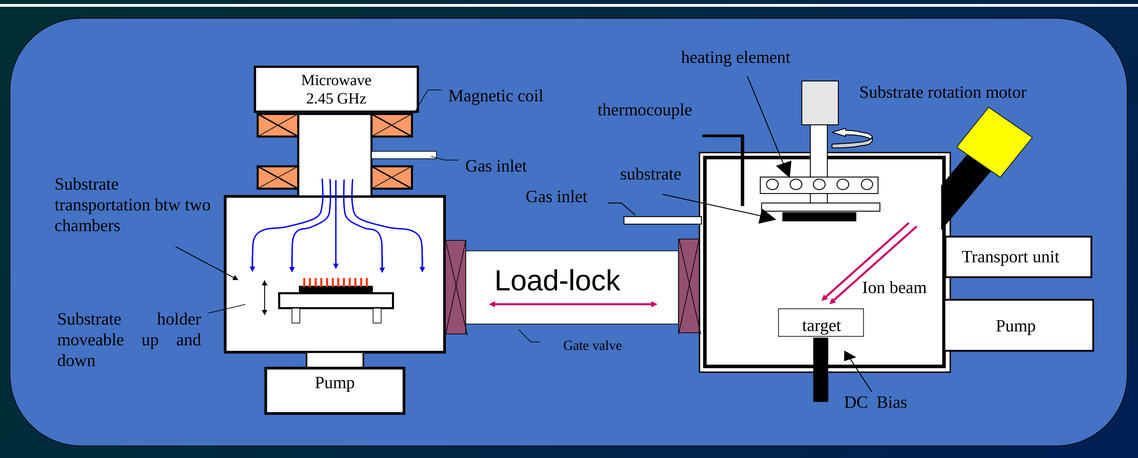
TEM觀察的CNT


SEM觀察的CNT

奈米碳管之備製

- 電弧濺鍍法
- 熱化學氣相沉積法
- 電漿輔助化學氣相沉積 法
- 微波電漿化學氣相沉積法
- **電子迴旋共振化學氣相沉積法 (ECR-CVD)**

Ion Sputter + ECR-CVD 法備製奈米碳管之優勢

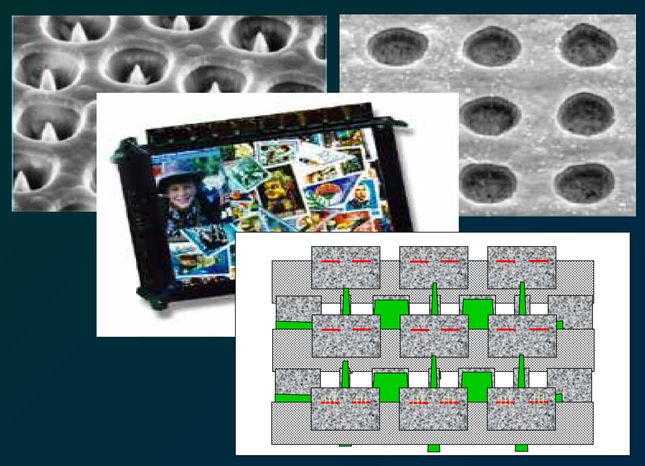


- 低溫成長的可能性
- 選擇性的區域成長
- 金屬觸媒氧化程度的控制
- 成長速率的提升與控制

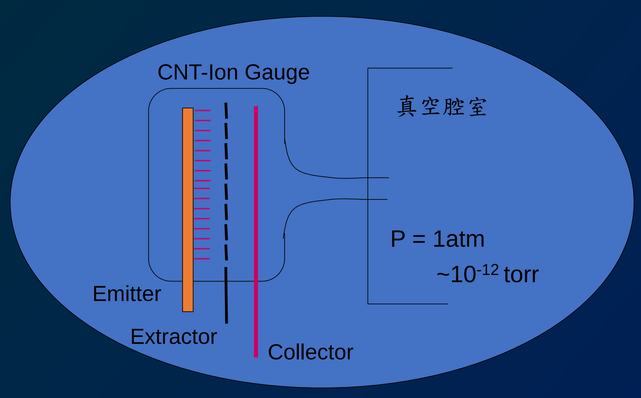
研究發展方向

平面顯示器

奈米碳管場發射顯示器之研發

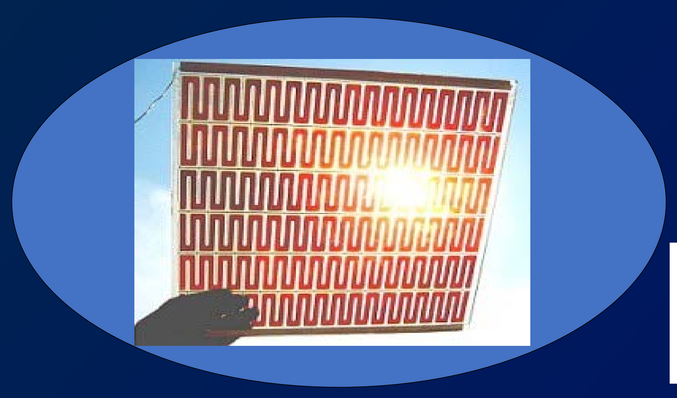


奈米碳管離子真空計之研發

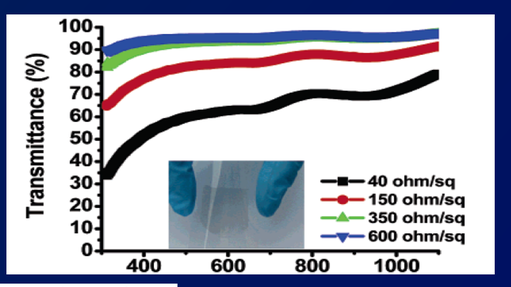


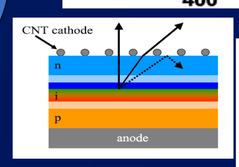
光電元件

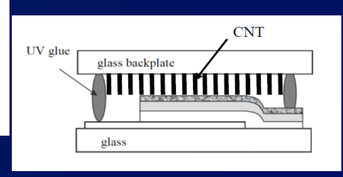
奈米碳管應用於太陽能電池之研發



奈米碳材應用於OLED之研發



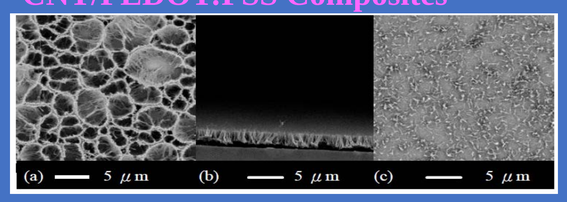




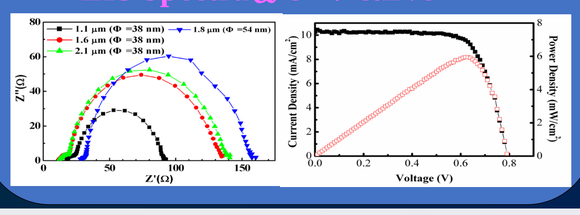
研究成果分享

太陽能電池元件

CNT/PEDOT:PSS Composites

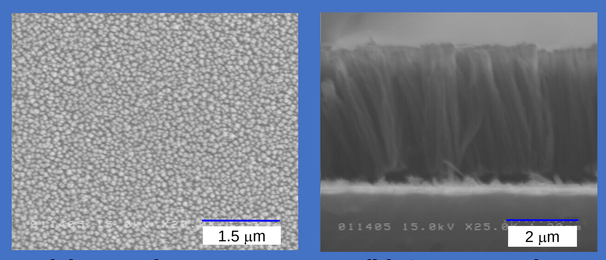


EIS Spectra & J -V curve



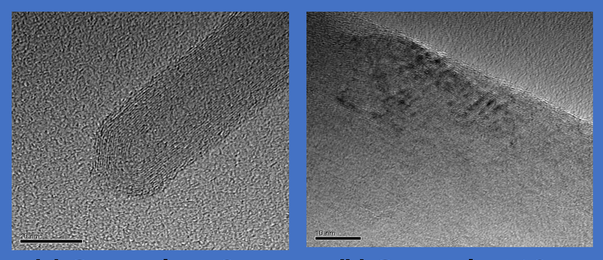
低溫奈米碳管合成

表面型態 (SEM)



(a) Top View (b) Cross section

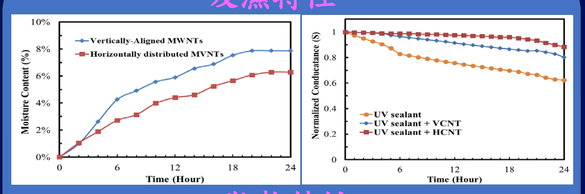
微結構(TEM)


(a) Co catalyst 3nm (b) Co catalyst 10nm

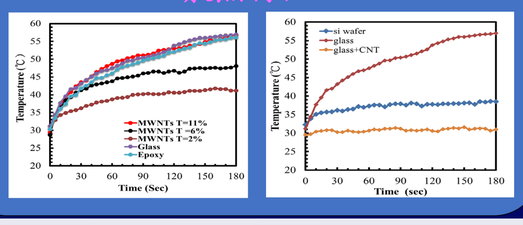
C_3H_8/N_2 = 20/20 sccm, MW =300W Pressure = 4 mTorr, Time = 5 min T< 200 ℃

有機發光二極體元件

吸濕特性



散熱特性



奈米光電實驗室 (K111)