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論文名稱(中)	反應式磁控濺鍍系統沉積非晶相矽碳氮薄膜與其場發射性質的研究
論文名稱(英)	Reactive Magnetron Sputtering Deposition and Field Emission of a-SiCN Films
其他題名	
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關鍵字(中)	場發射 矽碳氮薄膜 非晶碳膜 氧化銦錫玻璃 邊緣效應 穩定度
關鍵字(英)	field emission silicon carbon nitride thin film amorphous carbon film ITO glass edge effect stability
摘要(中)	本實驗利用反應式磁控濺鍍系統, 以碳化矽為靶材在不同的反應氣氛下沉積非晶相的矽碳氮薄膜, 作為場發射顯示器的陰極材料。 利用在反應氣體中摻入少許甲烷, 使得薄膜表面粗糙度由原先的奈米等級改變成次微米級,

	此變化增強了場發射效應中的幾何因子, 讓電子更容易從薄膜表面發射出。 藉著掃描式電子顯微鏡觀察薄膜表面形貌與估算薄膜沉積速率約為 1 μm/ hr; 穿透式電子顯微鏡判斷其並不具結晶性; 歐傑電子能譜對組成元素做定性與定量分析, 發現隨著反應氣氛中甲烷含量的增加, 薄膜組成由矽碳氮薄膜轉變成以碳為基底摻雜矽與氮的薄膜; 化學分析電子能譜與傅立葉轉換紅外光譜分析鍵結型態; 顯微拉曼觀察短程有序的石墨結構, 發現隨著在反應氣氛中甲烷含量的增加, 光譜中的 G 譜峰位置有朝向長波數位移, 其半高寬亦有變窄的趨勢, 這代表單位體積內短程有序的石墨數目增加了。 在真空下, 利用平行電板的方式量測薄膜場發射特性, 並對場發射的電性量測上做適當的改良, 將石墨電極換成刮有圖案的氧化銦錫玻璃(ITO pattern), 以利觀察薄膜場發射的均勻性與阻絕薄膜邊緣效應的電流貢獻。 並在不同的測試條件下, 觀察薄膜場發射特性的變化與穩定性。 具有最加場發射特性的薄膜其實驗參數在基板溫度為 1000oC, 反應氣氛(甲烷佔氮氣的比例)為 0.2 的條件下, 以 60 瓦高週波成長 30 分鐘, 所合成出的 a-C:Si,N 薄膜。 此薄膜的起始電場【註】為 9.4V/ μm, 且在長時間電場操作下的穩定性亦優於以純氬氣所沉積的 a-C:Si 薄膜。 註: 定義為薄膜場發射電流密度達到 10 μA/cm2 時所需的外加電場(EJ10)
摘要(英)	In this thesis, I studied the growth of amorphous SiCN films utilizing reactive magnetron sputtering and applied it for field emission material. In the deposition process, methane was introduced, which significantly roughen the surface from the original nanometer scale roughness to submicron roughness, which significantly enhanced the geometrical enhancement factor and promoted the electron emission. The deposition rate is about 1 μm/hr, which is determined by SEM cross-section image. The compositions study determined by AES shows that carbon dominates the film at high CH4 content. ESCA and FTIR were further applies to study the bounding state of each components. Micro-Raman study also shows blueshift and narrowing of the G band at higher CH4 content, indicating increasing of short-range order graphitic phase. Field emission measurements have been performed in vacuum, using parallel arrangement of anode and cathode. In the present work, we replaced the graphite electrode by ITO pattern electrode, in order to check not only the uniform emission from the cathode but also avoid the emission current from the edge of cathode. The lowest turn on field for a-C:Si,N was found to be 9.4V/ μm. Emission stability have been invested at different condition and it is observed that the emission stability of a-C:Si,N for longer duration is better than a-C:Si deposited by argon gas.
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