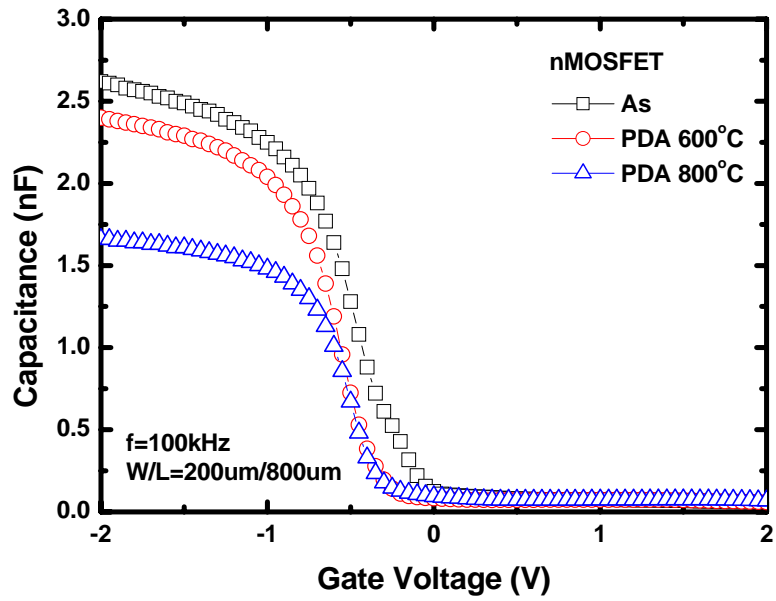
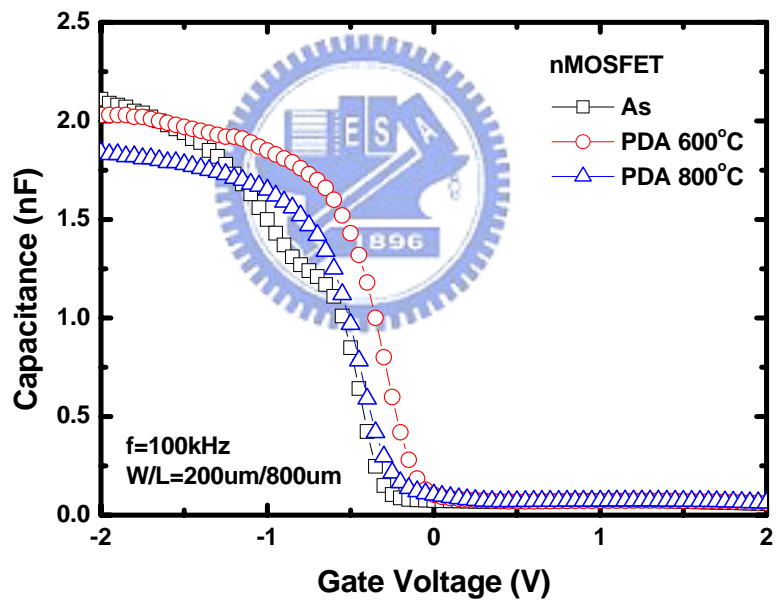


	TaPt/HfO ₂ nFET (SC1 treatment)	TaPt/HfO ₂ nFET (SC1 treatment)	TaPt/HfO ₂ nFET (SC1 treatment)	TaPt/HfO ₂ nFET (RTO treatment)	TaPt/HfO ₂ nFET (RTO treatment)	TaPt/HfO ₂ nFET (RTO treatment)
PDA (°C)	n/a	600	800	n/a	600	800
CET (nm)	2.11	2.3	3.33	2.62	2.72	3
Gate leakage @V_{fb+1} (A/cm²)	1E-7	5.3E-7	1.4E-7	5.9E-7	6.3E-8	3E-7
Flatband Voltage (V)	-0.12	-0.34	-0.36	-0.35	-0.14	-0.27
Threshold Voltage (V)	0.79	0.33	0.36	0.7	0.66	0.54
Drain current @V_{ds}=V_g=1V (mA/cm²)	1.04	3.89	4.73	1.34	2.28	4.47
S.S. (mV/dec)	110.4	93	93	156.1	97.5	84
mobility@ V_g=0.9V (cm²/Vs)	126	110	200	151	198	226

表 5-1 SC1 前處理和 RTO 前處理二氧化鈣場效電晶體的特性。



(a)



(b)

圖 5-1 二氧化鉛場效電晶體的電容特性曲線。(a)SC1 前處理，(b)RTO 前處理。

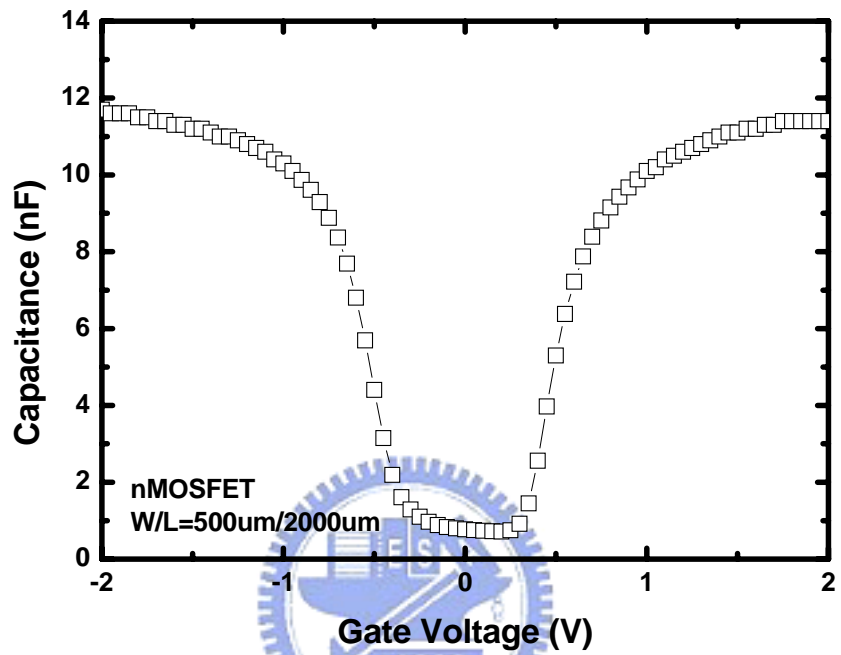
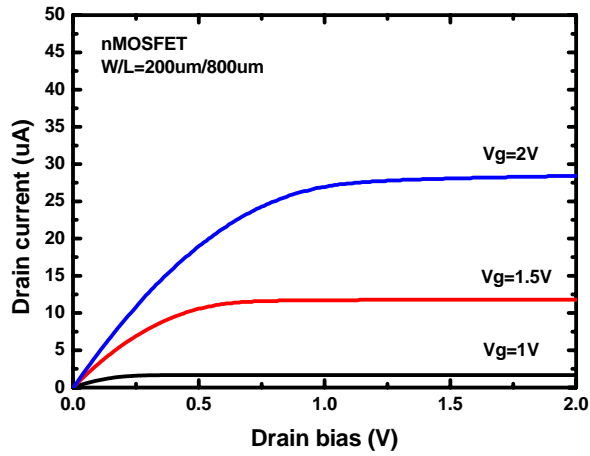
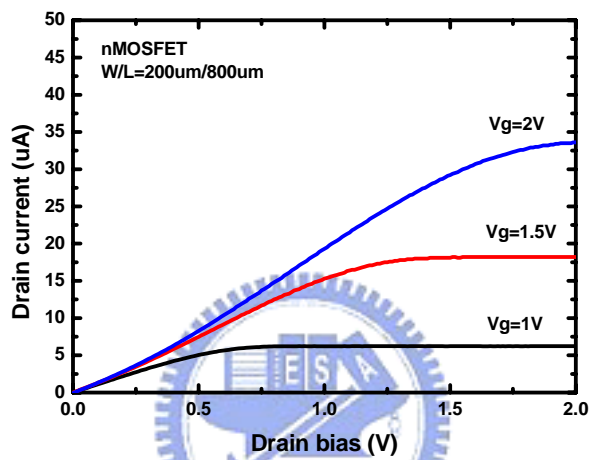


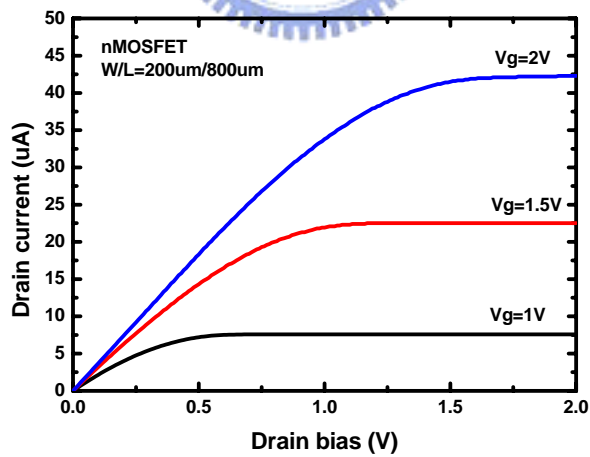
圖 5-2 SC1 前處理經過 800°C 退火的二氧化鉛場效電晶體，源極和汲極與矽基板等電位時的 C-V 曲線。



(a)

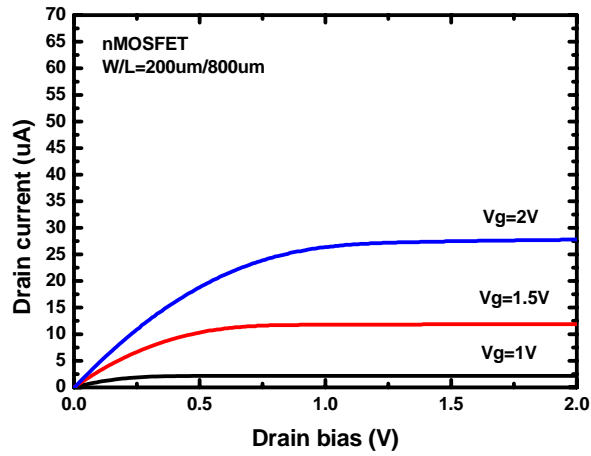


(b)

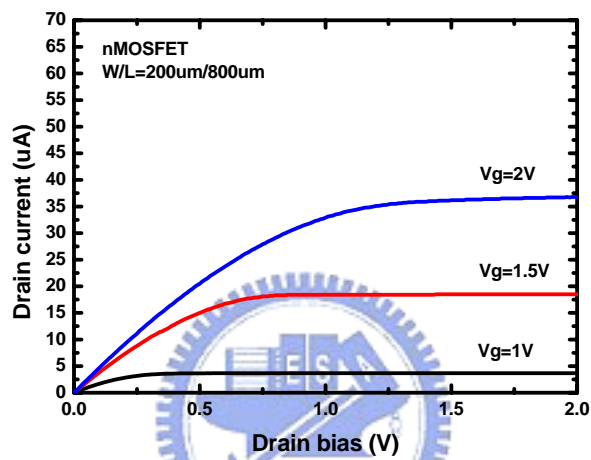


(c)

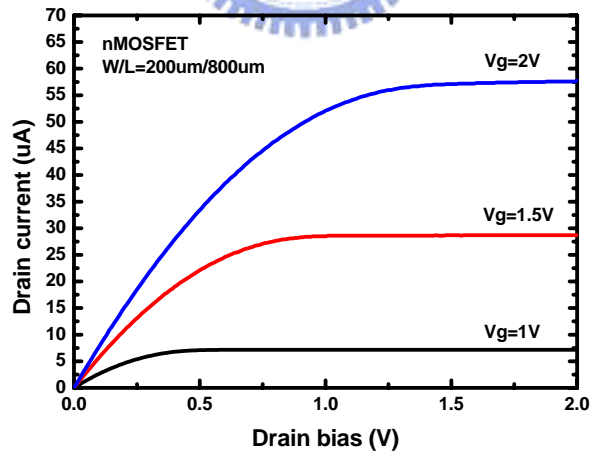
圖 5-3 SC1 前處理二氧化鈣場效電晶體 $I_{DS}-V_{DS}$ 特性。(a)As, (b)經過 PDA 600°C 退火處理, (c)經過 PDA 800°C 退火處理。



(a)

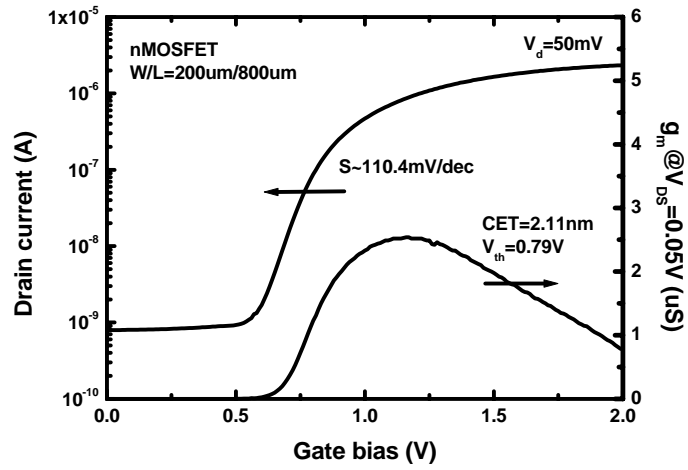


(b)

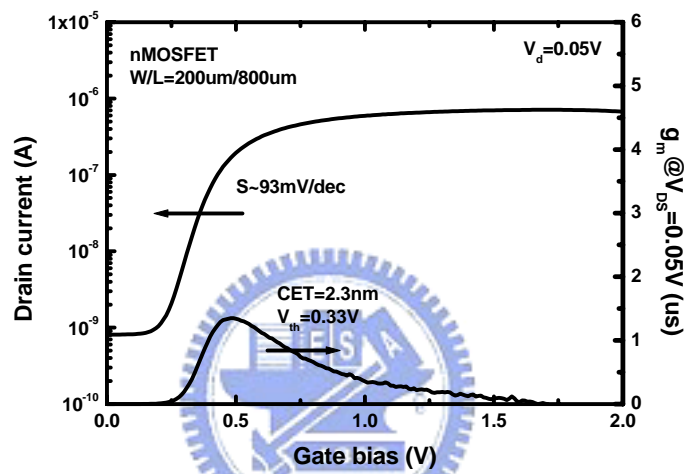


(c)

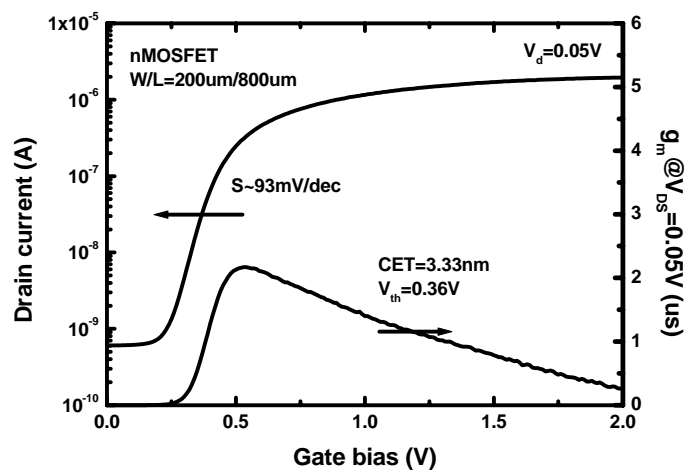
圖 5-4 RTO前處理二氧化鈣場效電晶體 $I_{DS}-V_{DS}$ 特性。(a)As，(b)經過PDA 600°C退火處理，(c)經過PDA 800°C退火處理。



(a)

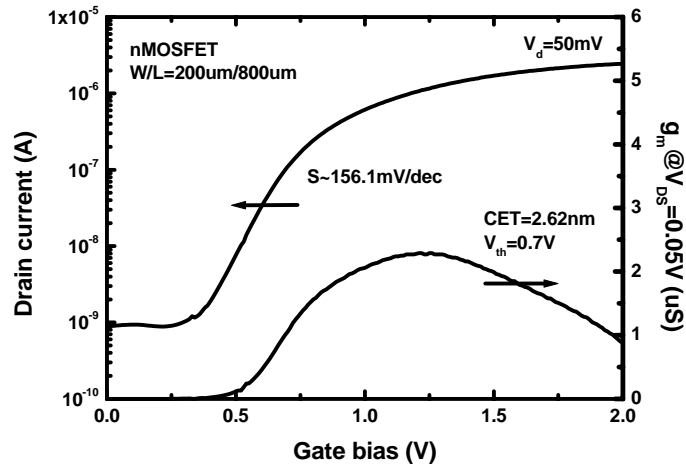


(b)

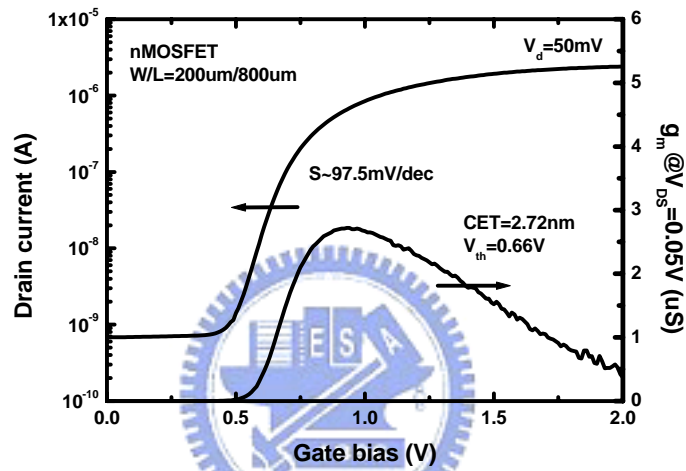


(c)

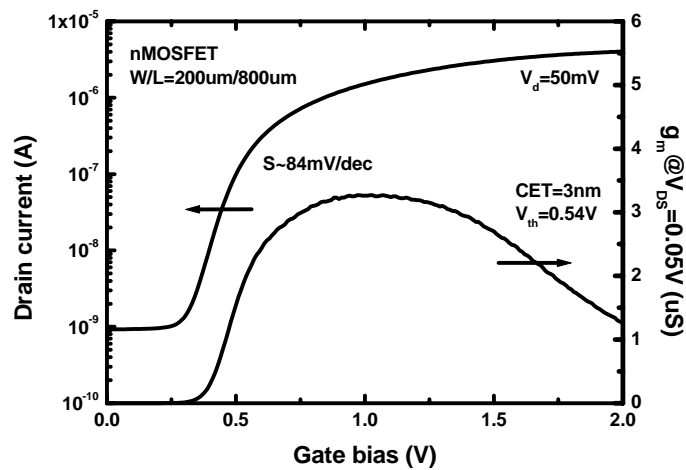
圖 5-5 SC1 前處理二氧化鈣場效電晶體 $I_{DS}-V_{GS}$ 特性。(a)As，(b)經過 PDA 600°C 退火處理，(c)經過 PDA 800°C 退火處理。



(a)

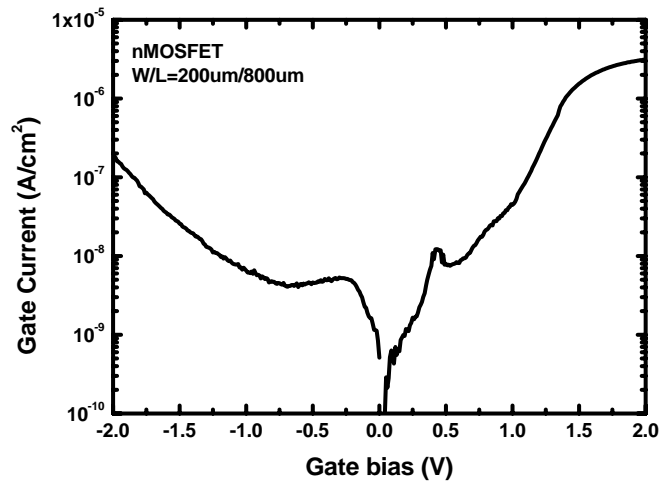


(b)

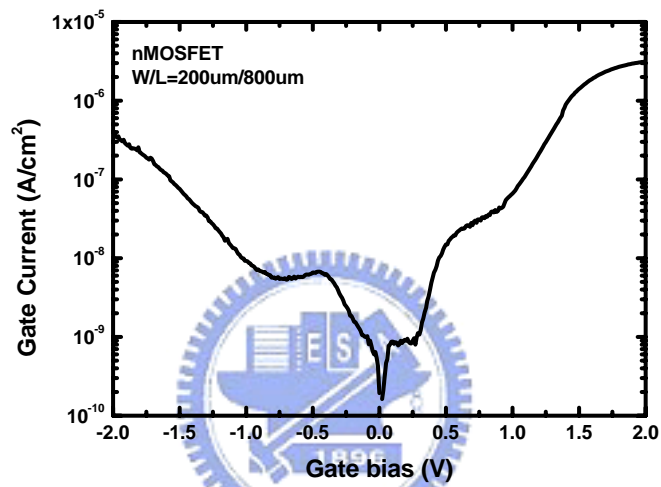


(c)

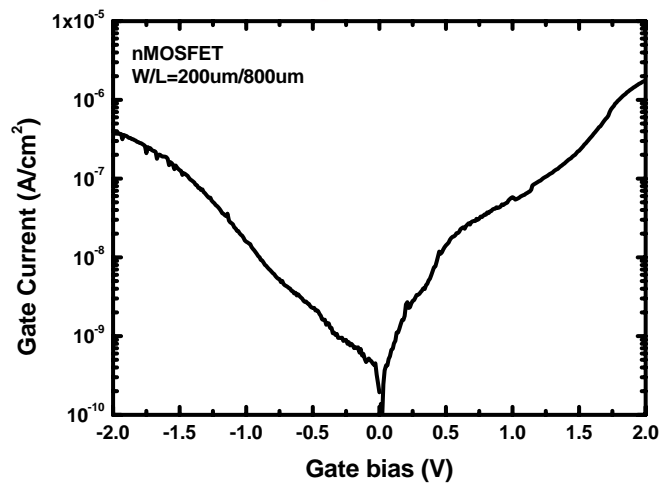
圖 5-6 RTO前處理二氧化鉛場效電晶體 $I_{DS}-V_{GS}$ 特性。(a)As，(b)經過PDA 600°C退火處理，(c)經過PDA 800°C退火處理。



(a)

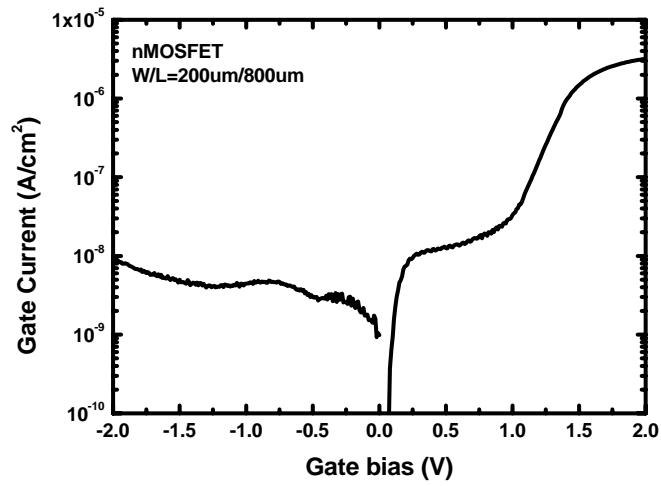


(b)

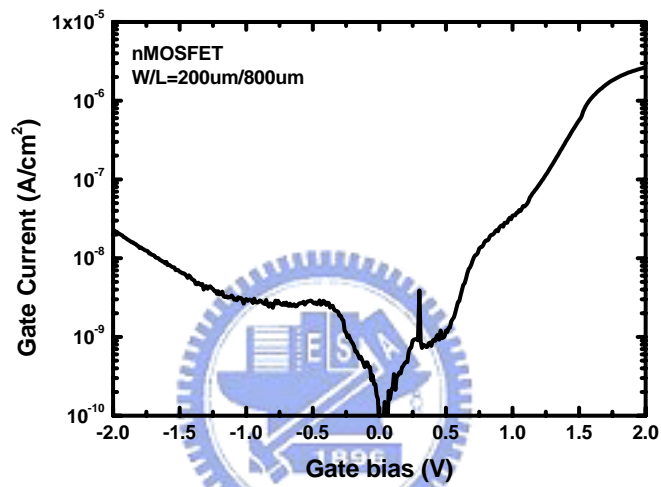


(c)

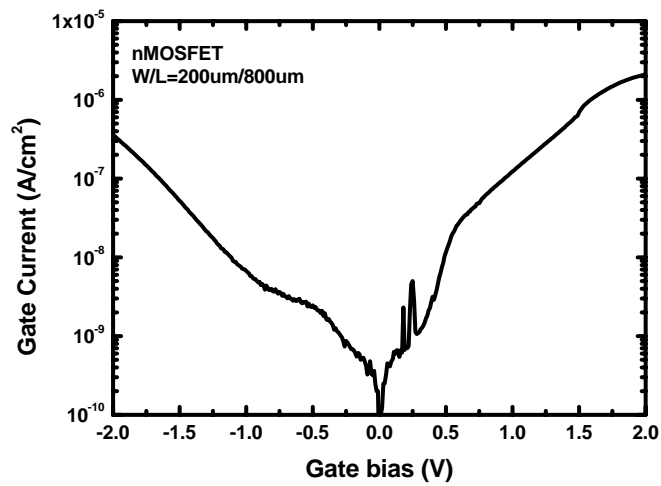
圖 5-7 SC1 前處理二氧化鈣場效電晶體 $I_{GS}-V_{GS}$ 特性。(a)As，(b)經過 PDA 600°C 退火處理，(c)經過 PDA 800°C 退火處理。



(a)

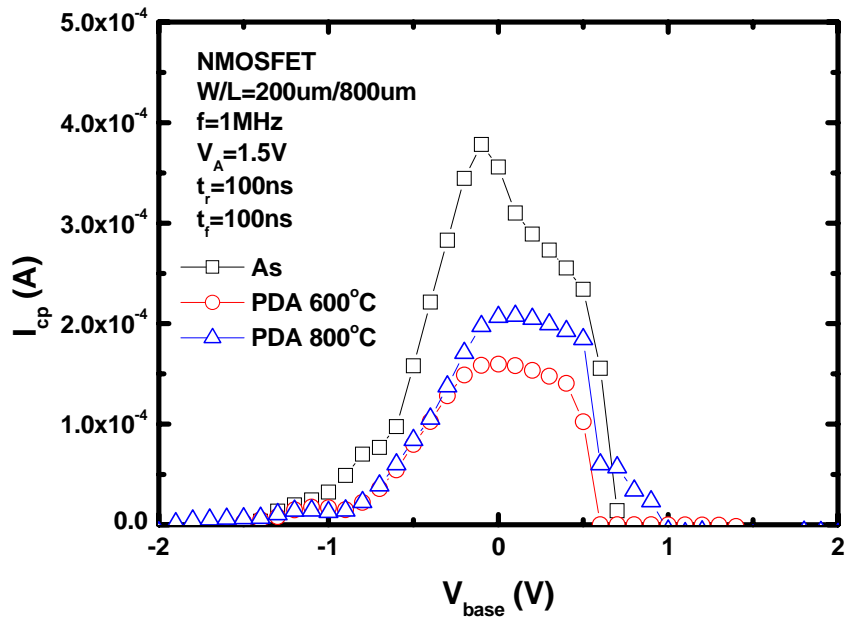


(b)

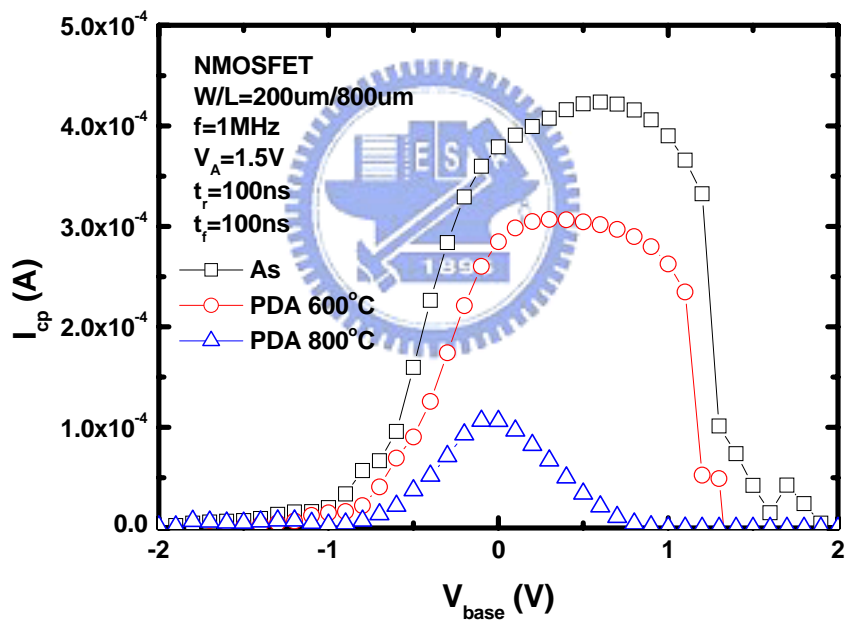


(c)

圖 5-8 RTO前處理二氧化鉛場效電晶體 $I_{GS}-V_{GS}$ 特性。(a)As，(b)經過PDA 600°C退火處理，(c)經過PDA 800°C退火處理。



(a)



(b)

圖 5-9 Charge pumping 電流對基準電壓關係圖。(a)SC1 前處理，(b)RTO 前處理。

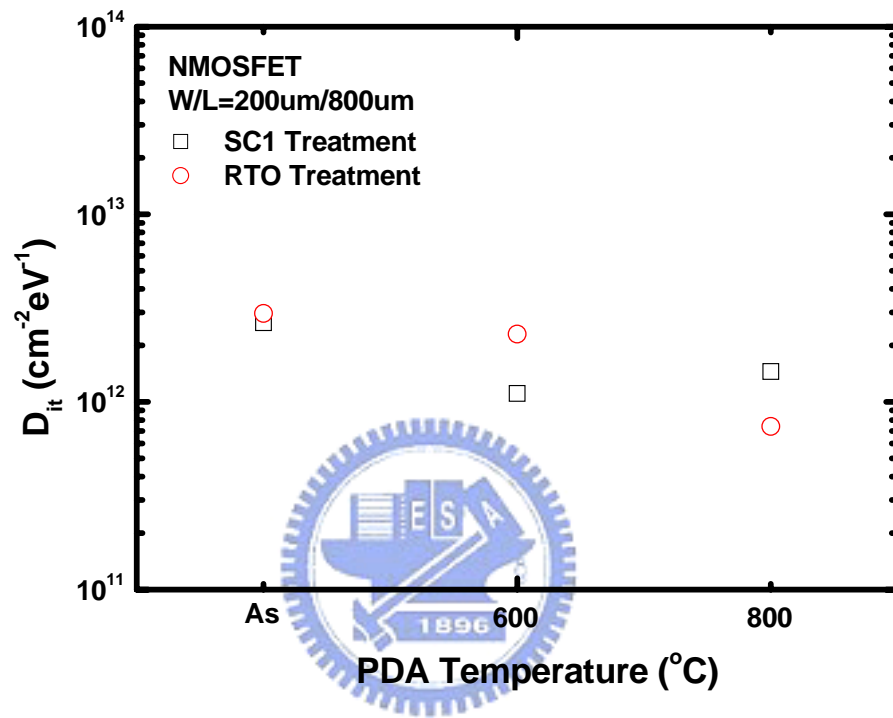
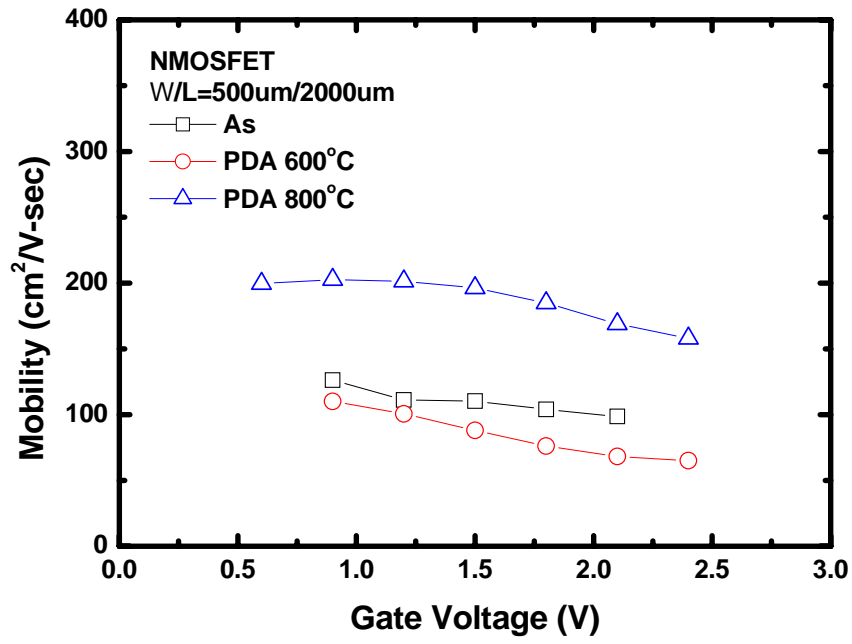
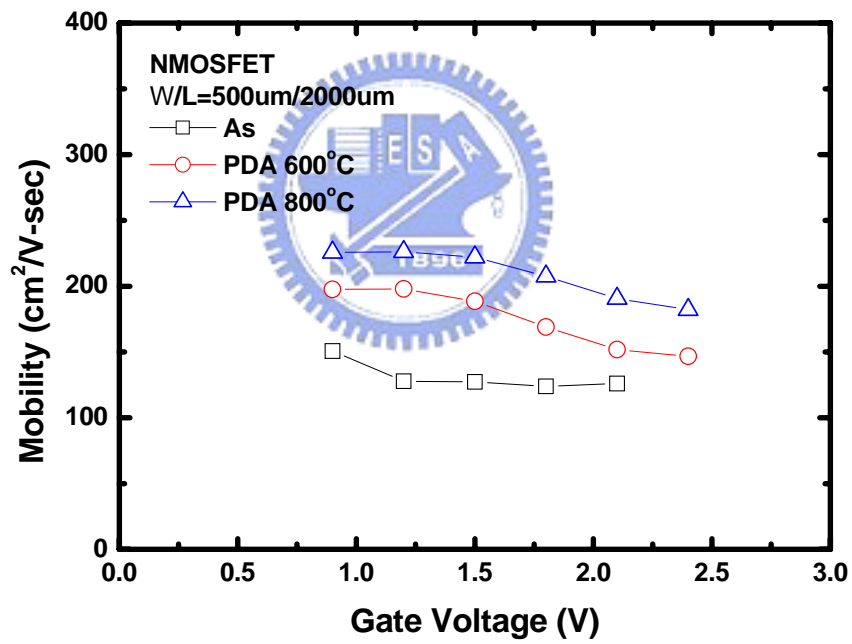


圖 5-10 利用 charge pumping 方法得到的界面缺陷密度。

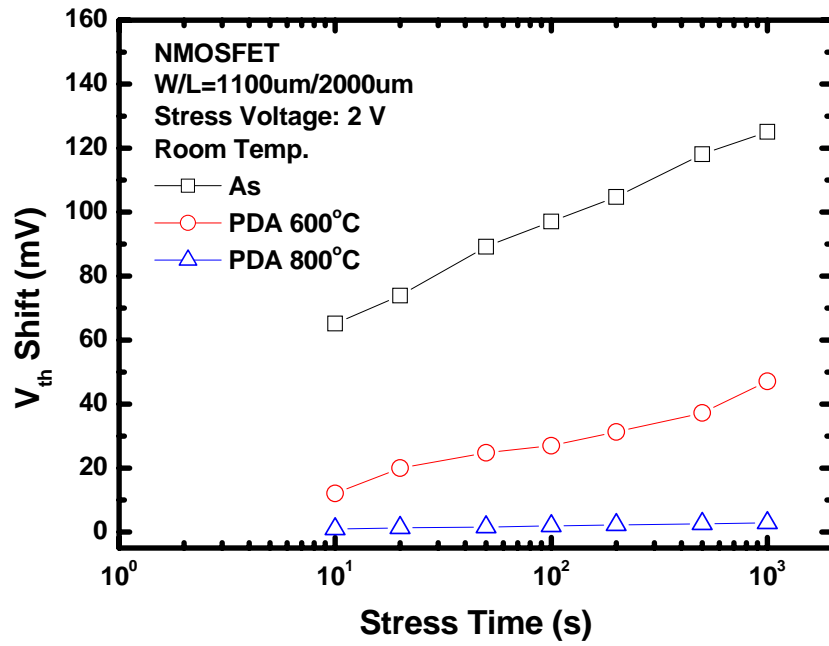


(a)

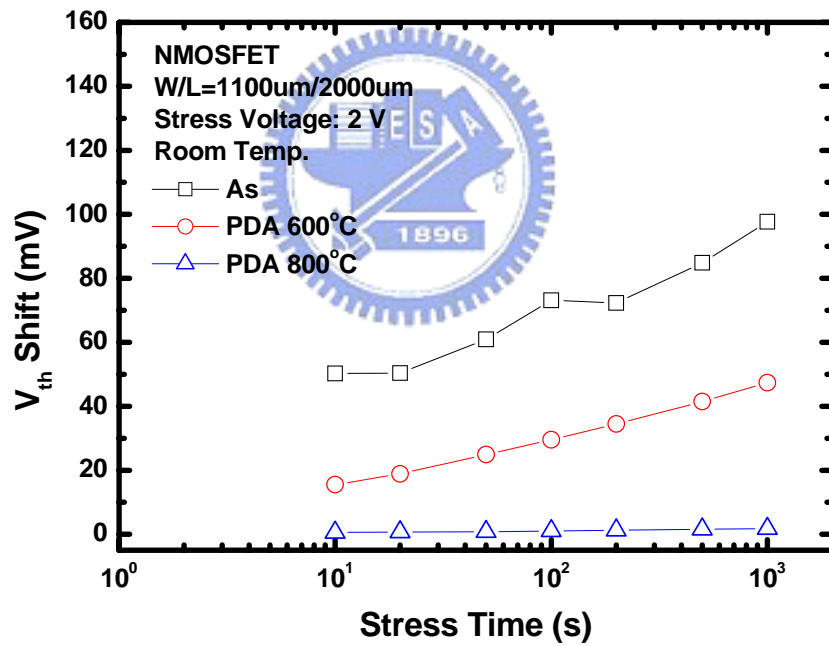


(b)

圖 5-11 遷移率對閘極電壓關係圖。(a)SC1 前處理，(b)RTO 前處理。



(a)



(b)

圖 5-12 臨界電壓變化量與偏壓時間的關係圖。(a)SC1 前處理, (b)RTO 前處理。

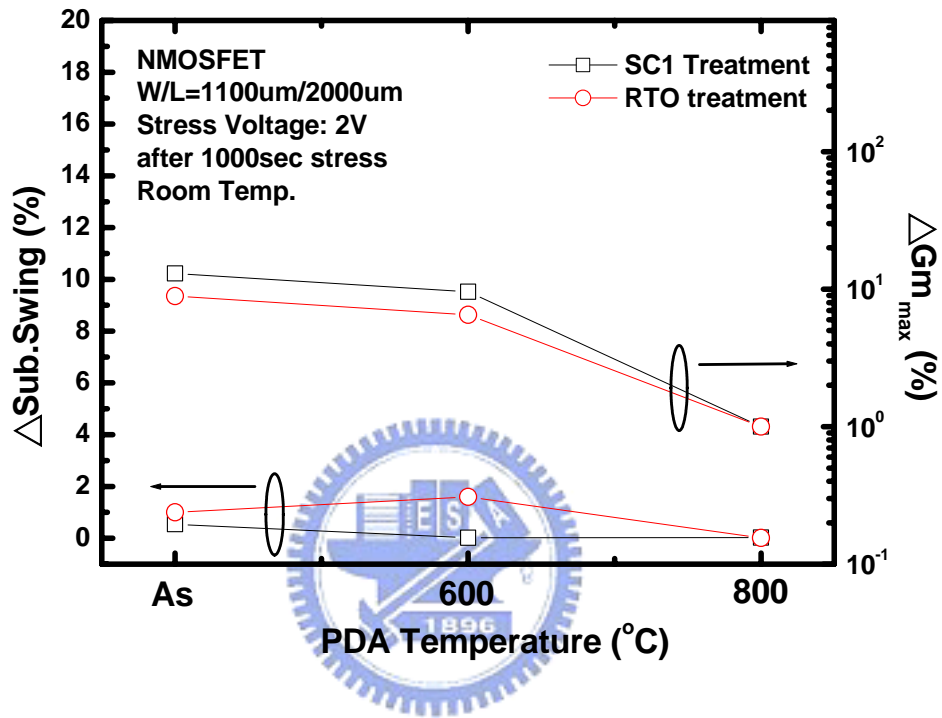


圖 5-13 正偏壓 1000 秒後電導和次臨界斜率的變化量百分比。