微波及光電元件實驗室

Microwave and Optoelectronic Devices Laboratory

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研究方向

◆三五族化合物半導體材料 AlGaAs/GaAs, InGaP/GaAs, InAlGaP/GaAs, InAlAs/InGaAs/InP, AlGaN/GaN以及InAlAsSb/InP等異質材料系統

◆**微波元件:**

(a) 實空間傳輸元件 (Real-Space Transfer Devices)

(b) 高電子移動率電晶體 (High-Electron Mobility Transistor)

(c) 異質接面雙極性電晶體 (Heterojunction Bipolar Transistor)

◆**光電元件:**

(a) 發光二極體 (Light-Emitting Diode)

(b) 光檢測器 (Photodetector)

研究成果

Layer
20 nm n⁺-$In_{0.5}Ga_{0.5}As$
25 nm i-$In_{0.45}Al_{0.55}As$ Schottky layer
δ-doping
4 nm i-$In_{0.45}Al_{0.45}Al_{0.55}As$ spacer layer
20 nm i-$In_{0.5}Ga_{0.5}As$ channel layer
150 nm i-$In_{0.45}Al_{0.55}As$ Barrier/Buffer
500 nm i-$In_XAl_{1-x}As$ (x=0→0.475) Metamorphic buffer layer
S. I. GaAs Substrate

Fig. Schematic representations of the MHEMT under trial.

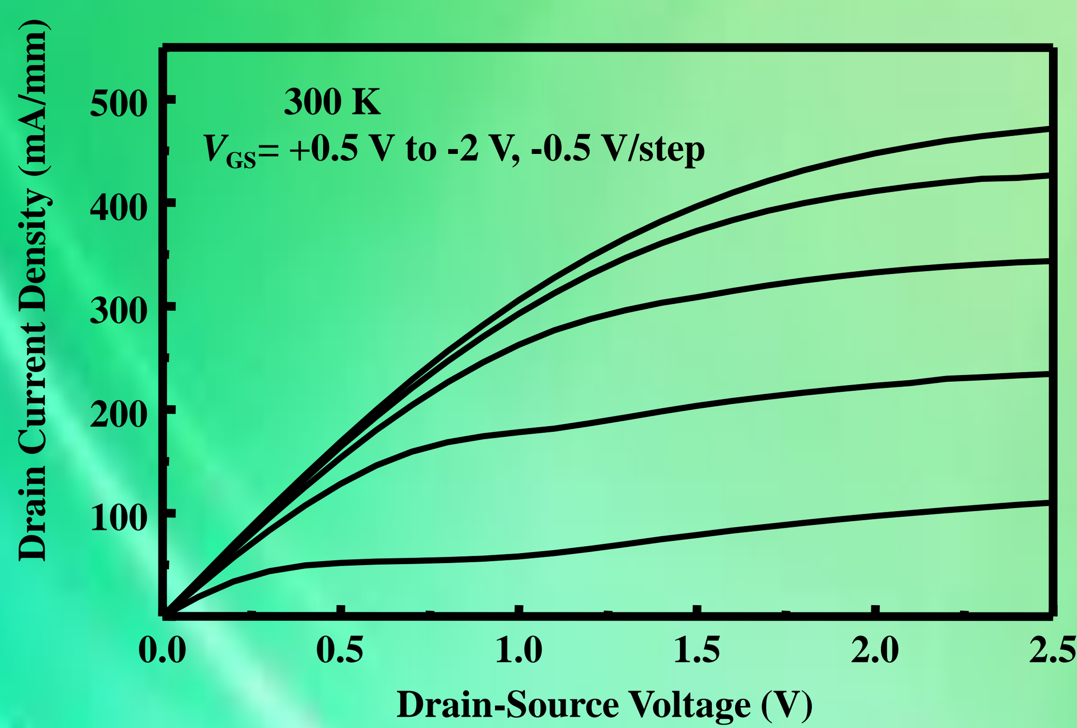

Fig. 1 Common-source I_D -V_{DS} characteristics.

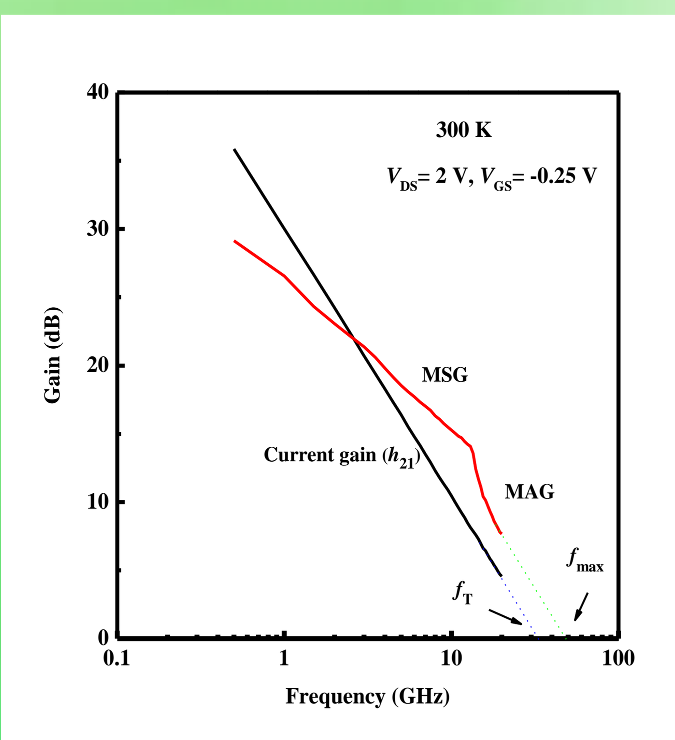

Fig. 2 Frequency-dependence of current gain h_{21} and power gain.

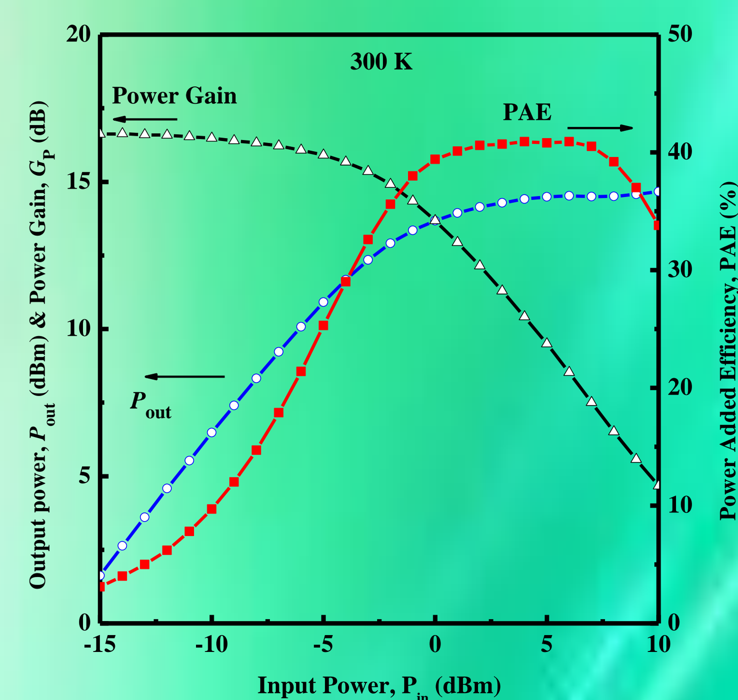

Fig. 3 P_{out}, GP and PAE at 2.4 GHz as functions of input power to the MHEMT at V_{DS}=2.5 V.

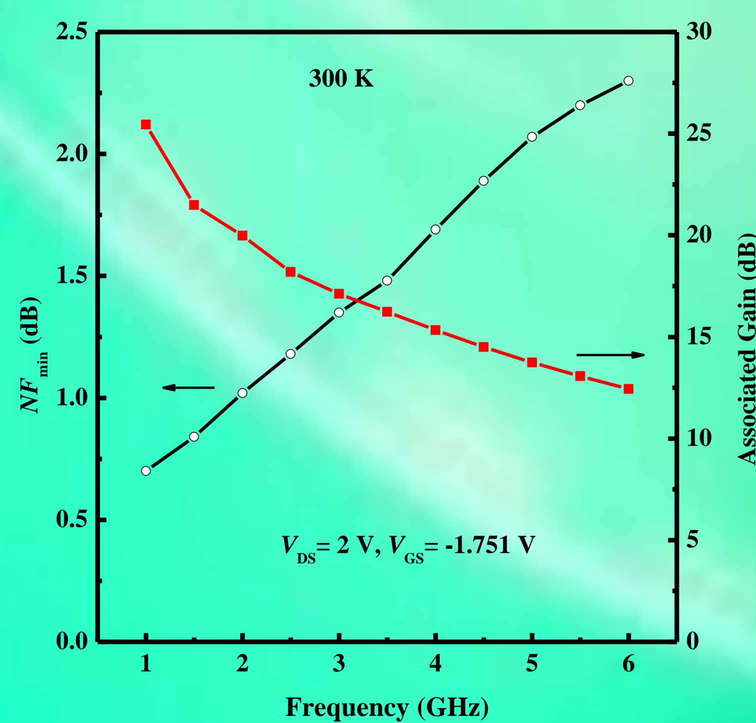

Fig. 4 Minimum noise figure NF_{min} and associated gain versus frequency.

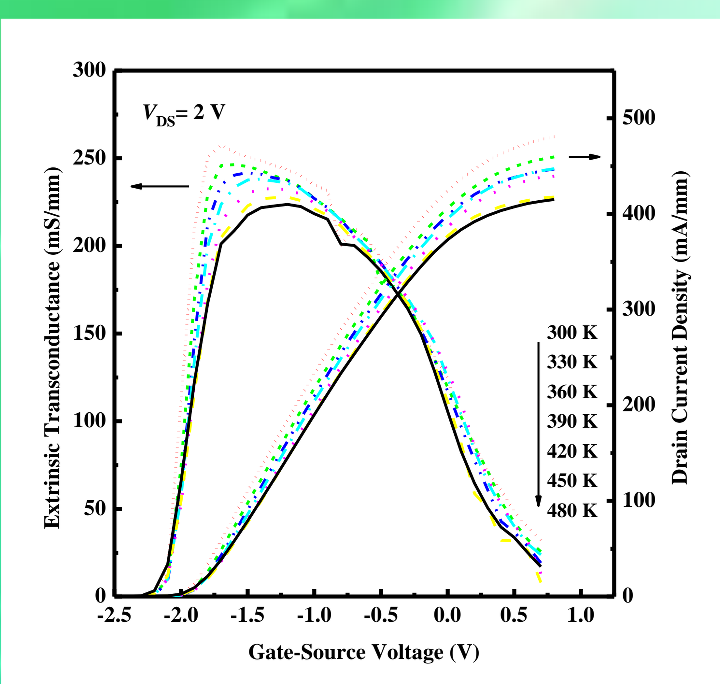

Fig. 5 DC transfer characteristics of the MHEMT at various temperatures.

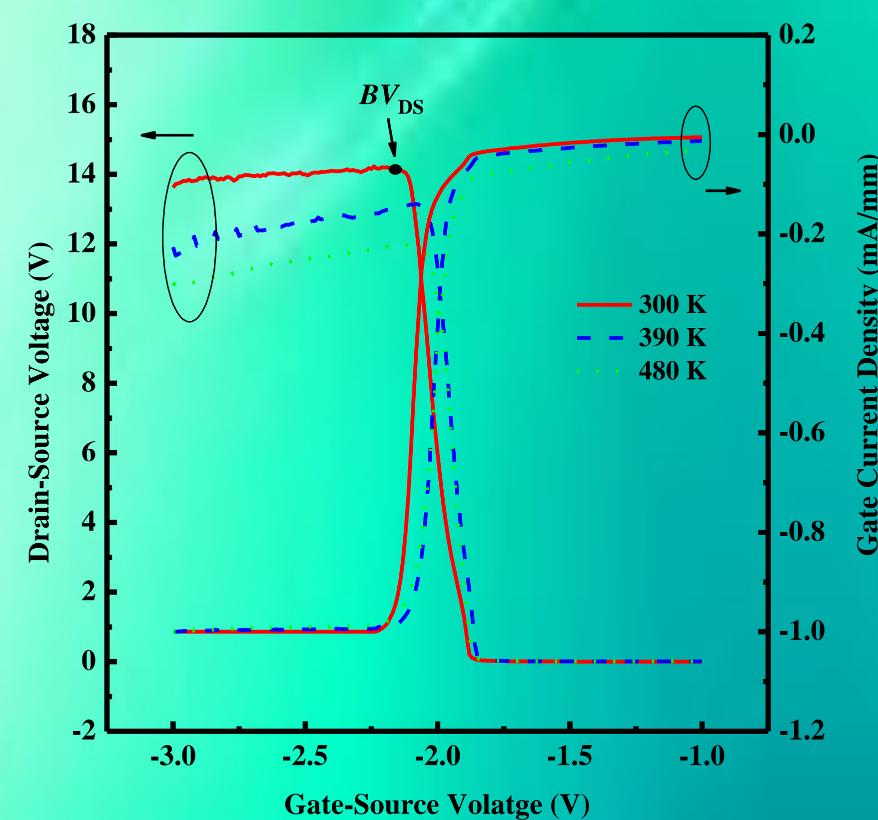

Fig. 6 Drain-current injection scan of MHEMT for I_D=1 mA/mm at various temperatures. The peak of the V_{DS} trace marks the drain-source breakdown voltage V_{BDS}.

材料科學與工程學系

Material Science and Engineering,NDHU