

**A novel I-line phase shift mask (PSM) technique
for submicron T-Gate formation**

David K. Fu, H.C. Chang,
C. Y. Joey Fang and Edward Yi. Chang

Institute of Materials Science and Engineering
National Chiao Tung University
1001 Ta-Hsueh Road
Hsinchu, Taiwan 300, ROC

Submicron T-gate formation with I-line using phase shift mask (PSM) technique has become very attractive due to its low capital investment and high throughput for GaAs MMIC technology. In this paper a novel submicron 0.2 μ m T-gate technology using phase shift mask technique is reported.

The 8% half-tone PSM was selected for the definition of the isolated narrow space. Before lithography, 2500 \AA SiN film was deposited on the wafer. After I-line PSM exposure and RIE etch of the silicon nitride film, 0.25 μ m opening was formed on the SiN film. To further reduce the dimension of the opening, the wafer was then deposited additional 500 \AA nitride and etched back using RIE without any mask. 0.2 μ m opening was formed on the wafer after the dry etch (Fig.1). The wafer was then coated with another layer of photoresist to form lift-off structure (Fig.2). This novel process is a high throughput T-gate I-line PSM process compared to conventional E-beam lithography technology for GaAs MMIC production.

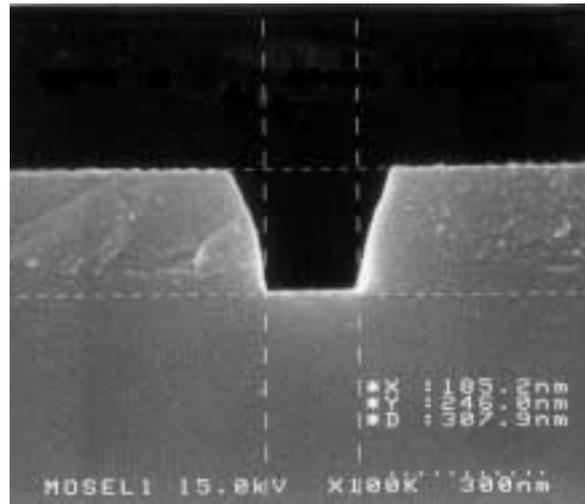


Fig.1 0.2 μ m opening after nitride etch

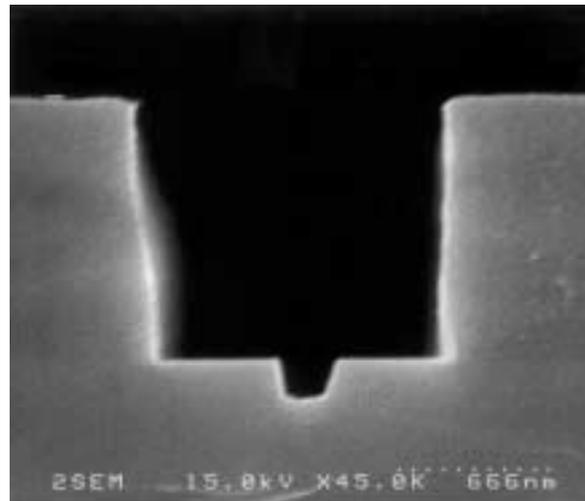


Fig.2 0.2 μ m lift-off structure