

課題番号 : F-14-IT-0041
 利用形態 : 共同研究
 利用課題名 (日本語) :
 Program Title (English) : Effect of oxide quality on the DC Performance of InAs Quantum Well MOSFETs
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1. 概要 (Summary)

The influence of epitaxial structures on device DC was investigated. We found that optimized oxide quality and sub-channel indium (In) composition are beneficial to the drive current and the suppression of short channel effects.

2. 実験 (Experimental)

The devices with three kinds of InGaAs/InAs/InGaAs composite channel were fabricated following the gate-last process with 10-nm Al₂O₃ and fine gate exposures by e-beam lithography (JBX-6300 at Tokyo Tech, SEM, and surface profiler).

3. 結果と考察 (Results and Discussion)

The device with oxide treatment exhibits good DC at low V_D bias of 0.5 V (I_D of 350 μA/μm, peak g_m of 279.8μS/μm, SS of 250 mV/decade, respectively) compared with no treatment device (I_D of 257 μA/μm, peak g_m of 270μS/μm, SS of 684 mV/decade, respectively). The improvement was attributed to the reduction in D_{it} and the increase in gate control ability.

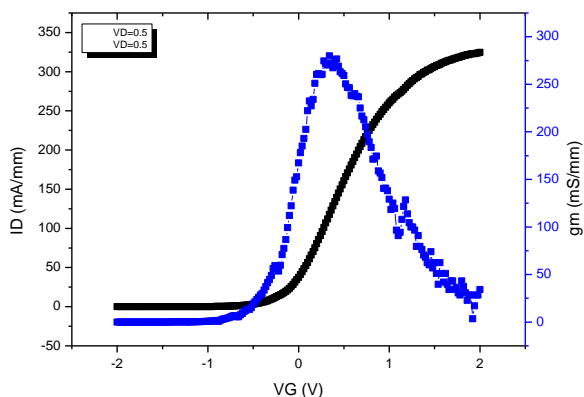


Fig. 1 Transfer characteristics of ITC QW-MOSFET.

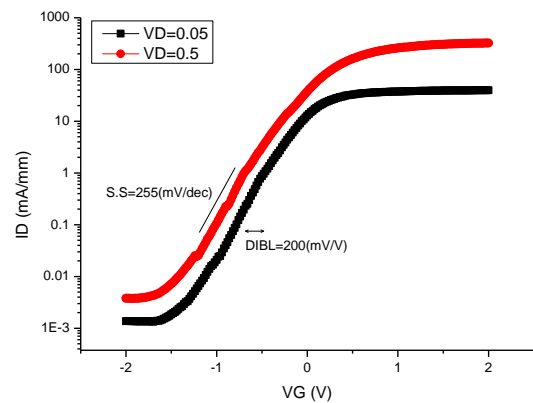


Fig. 2 Log scale I-V characteristics of QW-MOSFET.

The results indicate that the oxide quality is important for emerging sub-10-nm low-power and high-performance logic. The improvement in device performance is attributable to the use of ammonia sulfur for pretreatment, PDA with 400 degree.

4. その他・特記事項 (Others)

共同研究者等 (Coauthor) :
 Y. Miyamoto, Tokyo Tech
 Guan-Yu Lin, NCTU

5. 論文・学会発表 (Publication/Presentation)

None

6. 関連特許 (Patent)

None