PD-SOI기판에 제작된 SiGe p-MOSFET의 신뢰성 분석

최상식, 최아람, 김재연, 양전욱, 한태현*, 조덕호*, 황용우*, 심규환
전북대학교 반도체·화학공학부 반도체 물성연구소, AUK*

Reliability Analysis of SiGe pMOSFETs Formed on PD-SOI

Sang-Sik Choi, A-Ram Choi, Jae-Yeon Kim, Jeon-Wook Yang, Tae-Hyun Han*, Deok-ho Cho*, Young-Woo Hwang*, Kyu-Hwan Shim
School of Semiconductor and Chemical Engineering Semiconductor Physics Research Center,
Chonbuk National University, AUK*

Abstract : The stress effect of SiGe p-type metal oxide semiconductors field effect transistors(MOSFETs) has been investigated to compare device properties using Si bulk and partially depleted silicon on insulator(PD SOI). The electrical properties in SiGe PD SOI presented enhancements in subthreshold slope and drain induced barrier lowering in comparison to SiGe bulk. The reliability of gate oxides on bulk Si and PD SOI has been evaluated using constant voltage stressing to investigate their breakdown (~ 8.5 V) characteristics. Gate leakage was monitored as a function of voltage stressing time to understand the breakdown phenomena for both structures. Stress induced leakage currents are obtained from *I-V* measurements at specified stress intervals. The 1/f noise was observed to follow the typical $1/f^{\gamma}$ (γ = 1) in SiGe bulk devices, but the abnormal behavior γ=2 in SiGe PD SOI. The difference of noise frequency exponent is mainly attributed to traps at silicon oxide interfaces. We will discuss stress induced instability in conjunction with the 1/f noise characteristics in detail.

Key Words : PD SOI, SiGe, SILC, MOSFET

감사의 글

"이 연구는 2005년 교육인적자원부의 재원으로 한국학술진흥재단의 지원(KRF-2005-005-J07502)과 BK21 차세대에너지 소재·소자 사업단의 지원을 받아 수행된 연구임"