E. Compound Semiconductors 분과

Room K
청옥II+III(6층)

2016년 2월 24일(수) 10:10-11:40

[WK2-E] III-V Device

좌장 : 민병규(한국전자통신연구원), 김해천(한국전자통신연구원)

WK2-E-1
10:10-10:25

High Performance $In_{0.7}Ga_{0.3}As$ MOSFETs with Al_2O_3/HfO_2

Seung Woo Son, Jin Su Kim, Hwal Kim, Jung Ho Park, Do-Kywn Kim, Jung-Hee Lee, and Dae-Hyun Kim
School of Electronics Engineering, Kyungpook National University

WK2-E-2
10:25-10:40

Oxidation Study on the (100), (110) and (111) Surfaces of InAs by ab-initio Calculations

In Won Yeu[1,2], Cheol Seong Hwang[2,3], and Jung-Hae Choi[1]
[1]Center for Electronic Materials, Korea Institute of Science and Technology,
[2]Department of Materials Science and Engineering, Seoul National University,
[3]Inter-university Semiconductor Research Center, Seoul National University

WK2-E-3
10:40-10:55

Improvement of Thermal Stability of Ni-InGaAs on Source and Drain by using Pd Interlayer for High Performance n-InGaAs MOSFET

Meng Li[1], Jeyoung Kim[1], Jungwoo Oh[2], and Hi-Deok Lee[1]
[1]Department of Electronics Engineering, Chungnam National University,
[2]School of Integrated Technology, Yonsei University

WK2-E-4
10:55-11:10

Universal Mobility Behavior in $In_{0.7}Ga_{0.3}As$ QW-MOSFETs

Jung Ho Park, Hwal Kim, Do-Kywn Kim, Jin Su Kim, Seung Woo Son, Jung-Hee Lee, and Dae-Hyun Kim
School of Electronics Engineering, Kyungpook National University

WK2-E-5
11:10-11:25

The Fabrication of InGaAs MOSFET with Y_2O_3 Gate Insulator

Seong Kwang Kim[1,2], Dae-Myeong Geum[2,3], Jungmin Lee[1], Min-Su Park[2], Jae-Phil Shim[2], Chang Zoo Kim[4], Hyung-jun Kim[2], Jin-Dong Song[2], Won Jun Choi[2], Sung-Jin Choi[1], Dae Hwan Kim[1], SangHyeon Kim[2], and Dong Myong Kim[1]
[1]School of Electrical Engineering, Kookmin University, [2]Korea Institute of Science and Technology,
[3]Department of Materials Science and Engineering, Seoul National University,
[4]Korea Advanced Nano Fab Center

WK2-E-6
11:25-11:40

Improvement of Interfacial-state Density (D_{it}) in High-k/$In_{0.53}Ga_{0.47}As$ MOSCAPs by D_2 High-Pressure Annealing (HPA)

Jin Su Kim[1], Seung Heon Shin[2], Do-Kywn Kim[1], Young Dae Cho[3], Chan-Soo Shin[3], Won-Kyu Park[3], Manny Rivera[4], Jae Ik Lew[4], Jung-Hee Lee[1], S. K. Banergee[2], Tae-Woo Kim[5], and Dae-Hyun Kim[1]
[1]School of Electrical Engineering, Kyungpook National University, [2]UT-Austin, USA,
[3]Korea Advanced Nano Fab Center, [4]PoongSan, USA, [5]Sematech, USA

Oxidation study on the (100), (110) and (111) surfaces of InAs by ab-initio calculations

In Won Yeu[1,2], Cheol Seong Hwang[2,3], and Jung-Hae Choi[1]*

[1] *Center for Electronic Materials, Korea Institute of Science and Technology,*

Seoul 02792, Korea

[2]*Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, Korea*

[3]*Inter-university Semiconductor Research Center, Seoul National University, Seoul 151-744, Korea*

E-mail: choijh@kist.re.kr

Due to the outstanding electron transport properties of Ⅲ-Ⅴ compounds, they became the one of the promising materials for the next-generation semiconductor materials. However, the exposure of a Ⅲ-Ⅴ surface to oxygen results in the high density of defect states, and the difficulty of avoiding surface oxidation makes it impossible to use Ⅲ-Ⅴ MOSFETs [1]. In order to deal with this problem, changing the surface orientation and the use of compound containing indium was suggested. For example, in GaAs MOSFET, (111)A orientation showed better device performance than the most common (100) orientation [2]. Meanwhile, it has been reported that the electron mobility of InAs is higher than that of GaAs and the MOSFET performances improve significantly when the InAs fraction in the InGaAs channel is increased [3]. In addition, the surface energy of InAs is lower than that of GaAs in most of the surface orientations. Therefore, the theoretical study on InAs surfaces has practical importance and can provide the basis on the further study on InGaAs. In this presentation, the initial stages of oxidation of the multi-orientation surfaces of InAs including (100), (110), (111)A and (111)B were studied by density functional theory (DFT) calculations. The dissociative chemisorption of O_2 has been shown on the transition metal [4], Si(001) [5] and GaAs(001) [6] surfaces. The process on InAs surfaces may be likely similar so we investigated the adsorption of O adatoms on the different surfaces. From the calculated potential energy surface (PES) of O adatoms, the adsorption sites and diffusion energy barriers were identified. Also, the reason of the different device performance depending on the different surface orientations was explained by the construction of detailed bonding structures of the oxidized surfaces.

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