Sym. A : Silicon Process

ISOLATION & DIELECTRICS-Ⅱ

A-THU-01

EFFECTS OF N2O PRESSURE ON THE CHARACTERISTICS OF ULTRA-THIN GATE OXYNITRIDE, MOON-SIG JOO, CHAN-HO LEE, IN-SEOK YEO (Hyundai Electronics Industries Co., Ltd., Ichon-si, 467-600, Korea)

For highly reliable gate dielectrics of deep sub-micron CMOS and Flash EEPROM, several nitridation technologies utilizing N2O, NO, and NH3 have been developed. In this study, we have investigated the effects of N2O pressure (40 Torr 600 Torr) on the characteristics of the N2O-annealed gate dielectrics (55Å) using I-V, C-V, TDDB measurements. TDDB characteristics under constant current stresses improve as the nitridation pressure decreases. In addition, although flat-band voltage data suggest fixed oxide charge independent of N2O pressure, the interface state density obtained by quasi-static C-V measurements decreases with decreasing N2O pressure. These results suggest that the N2O nitridation at low pressure regime is a more promising technology as a future gate dielectrics than the case at near atmospheric or atmospheric pressure.

A-THU-02

THE EFFECTS OF PRE-TREATMENT ON Ta_2O_5 DIELECTRICS FOR A DRAM CAPACITOR

K.J. NAM, Y.W. HYUNG, Y.W. PARK, S.I. LEE

Semiconductor R&D Center, Samsung Electronics Co.
San #24, Nongseo-Ri, Kiheung-Eup, Yongin-City,
Kyungki-Do, 449-900, Korea

The improved dielectric film property could be obtained by using the unique pretreatment called RTN+RTO instead of RTN in the Ta_2O_5 capacitor. In this paper the effects of RTN+RTO pretreatment on the Ta_2O_5 capacitor were investigated by TEM, XPS analysis compared with conventional RTN process. The RTN+RTO pretreatment made a stable interface layer such as SiON and maintained the original Ta_2O_5 property even after high temperature annealing. The electrical characteristics of the Ta_2O_5 film with RTN+RTO process were also enhanced.

A-THU-03

TEM STUDY OF Y_2O_3 FILMS GROWN ON Si (111) BY IONIZED CLUSTER BEAM, DONG. H. LEE and T. Y. SEONG (Dept. of Materials Science and Engineering, K-JIST, Kwangju, 506-712, Korea), M. H. CHO and C. N. WHANG (Dept. of Physics, Yonsei University, Seoul 120-749, Korea)

Y_2O_3 thin films have been grown on hydrogen-terminated Si (111), and oxygen-terminated Si (111) substrates at 500℃ by ultrahigh vacuum-ionized cluster beam depositon. The microstructures of the Y_2O_3/Si interface have been investigated by transmission electron diffraction (TED) and cross-sectional high resolution transmission electron microscope (HRTEM). The HRTEM results show that the ~20Å-thick intermediate amorphous layer is formed at the Y_2O_3/O-terminated Si interface, whereas the ~40Å-thick intermediate crystalline layer is formed at Y_2O_3/H-terminated Si interface. TED and HRTEM examination reveals the orientation relationship between Y_2O_3 and O-terminated Si: $(11\bar{1})_{Y_2O_3} \parallel (111)_{Si}$ and $[\bar{1}10]_{Y_2O_3} \parallel [\bar{1}10]_{Si}$. A model is given to describe why the formation of the intermediate layers at the interface depends on the surface conditions

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METALIZATION & INTERCONNECTION-Ⅱ

A-THU-04

The Fabricaton of $CoSi_2$ layer by Cobalt MOCVD.

Hwasung Rhee and ByungTae Ahn
(Dept. of Materials Science and Engineering, KAIST, Taejon, 305-701, Korea)

The self-aligned silicide process (SALICIDE) has been reported and used as an effective method for minimizing gate and source/drain resistance with subsequent increase in circuit speed. Among various candidate of silicides, $CoSi_2$ is the most promising from the view point of resistivity and epitaxial growth on Si. However, SALICIDE process by conventional method with Co layer deposition using PVD and subsequent RTA at 800℃ has many disadvantage in using multi-layer and two-step peocess and in reproducibility. To overcome the shortcomings of normal process for SALICIDE $CoSi_2$, new process for the formation of $CoSi_2$ layer was developed by cobalt MOCVD. $CoSi_2$ and other compound of Co and Si was formed on Si(100) substrate at 600 ℃ by cobalt MOCVD using $Co(C_5H_5)(CO)_2$ source. The sheet reistance of $CoSi_2$ layer was reduced in 1~2 Ω/□ after annealing at 800℃ and the preferred orientation was (001) orientation, which accorded with the orientation of Si(100) substrate. No cap layer for formation of $CoSi_2$ need in this process to prohibit the oxidation of Co layer. New process for the formation of $CoSi_2$ layer by cobalt MOCVD might be applied in metallization process for ULSI.

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