Poster Session

P-001

SHALLOW JUNCTION DIODE FORMATION USING EPITAXIAL $CoSi_2$ AS A DIFFUSION SOURCE,

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Abstract BF_2 and As^+ were ion-implanted onto epitaxial $CoSi_2$ thin film formed by rapidly thermal-annealing Co/Ti bilayers. Then the specimens were drive-in annealed at 500~1000℃ to form ultra-shallow junction diodes and to measure their I-V characteristics. When drive-in annealed at 500℃ for 100 sec., 100 nm deep p^+n junction diodes were formed and showed the best I-V characteristics with low leakage current. Meanwhile 50nm deep n^+p junction diodes were formed and showed the best I-V characteristics, when drive-in annealed at 500℃ for 280 sec.. In particular, for n^+p junction diodes, the leakage current was 2 orders of magnitude lower than for diodes formed by using Co monolayer. It was attributed to uniform $CoSi_2$/Si interfaces.

P-002

EPITAXIAL GROWTH OF $CoSi_2$ ON SILICON OXIDE WHICH WAS CHEMICALLY GROWN ON Si(100),

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An epitaxial $CoSi_2$ has become of considerable interest due to its good electrical conductivity and high thermal stability. Recently the epitaxial $CoSi_2$ was grown with Co/Ti bilayer. However, the Co-silicide formation using bilayer exhibits one drawback which is the formation of large voids near the edges of field oxide. In this work, cobalt(50Å) was deposited on the silicon oxide which was chemically grown on Si substrate and annealed in-situ between 400 and 750℃ with one step or two step annealing for 10 min. The epitaxial $CoSi_2$ was formed on Si at 550℃ in one step annealing and was also formed by two step annealing on Si at 450℃ followed by at 750℃ which exhibited a good Co-silicide quality. We also prepared co-deposited thin films of Co and Si and analyzed the properties with using XRD(X-ray diffractometer), AES(Auger electron spectroscopy), SEM(scanning electron microscope), AFM(atomic force microscope), HRTEM(high resolution TEM), RBS(Rutherford backscattering spectrometer). The Co-silicide formation will be discussed based on the reaction kinetics and basic thermodynamics.

P-003

THERMAL STABILITY OF Nb-Si-N BARRIERS,

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Abstract: In this study Nb-Si-N films were deposited on (100)Si wafers using a reactive sputtering technique and their thermal stability indispensable for a barrier metal against Cu was investigated using sheet resistance measurement, X-ray diffraction, and Auger electron spectroscopy depth profiling. The N_2/Ar gas flow ratio for the sputtering deposition of the Nb-Si-N film with the highest thermal stability was found to be 5%. The Nb-Si-N/Si film failed at 700℃. The failure mechanism of the Nb-Si-N is as follows: Cu atoms move to the Nb-Si-N/Si interface through the Nb-Si-N film and react with Si atoms in the Si substrate resulting in the formation of Cu_3Si at the Nb-Si-N/Si interface.

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P-004

THERMAL DECOMPOSITION OF TETRAKIS-DIMETHYL-AMIDO-TITANIUM AND TETRAKIS-DIETHYL-AMIDO-TITANIUM USED FOR TiN MOCVD,

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TiN films are used as a diffusion barrier in ultra-large-scale-integrated (ULSI) circuits. we studied thermal decomposition of tetrakis-dimethyl-amido-titanium(TDMAT) and tetrakis-diethyl-amido-titanium(TDEAT) for TiN MOCVD. ^{1}H-NMR and DSC are used to test thermal properties of the liquid phase compounds. NMR spectra showed TDEAT had a thermal stability up to 220℃, while TDMAT began to decompose over 140℃. DSC results also confirmed TDEAT had a better thermal stability than TDMAT. Gas phase reaction of the compounds examined by *in-situ* FT-IR showed TDEAT was decomposed at higher temperature due to steric hindrance effect. TDMAT and TDEAT had a similar dissociation mechanism in liquid and gas phase. Both precursors were decomposed at high temperature into Ti metal and dialkylamine.

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POSTER SESSION