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APPLICATION OF CVD-Ti/TiN BARRIER METAL FOR GIGA-BIT DRAM DEVICES, JEONG-TAE KIM, MOOSUNG CHAE, SANG-HYEOB LEE and SAM-DONG KIM (Semiconductor Research Division, HYUNDAI Electronics Ind. Co., Bubal-Eub, Ichon-Si, Kyungki-do, Korea)

Electrical characteristics of metal contacts formed on giga-bit DRAM scaled shallow junctions were investigated after employing $TiCl_4$-based CVD-Ti/TiN as a barrier metal in metallization. Depth and size of the metal contacts were 2.5㎛ and 0.3㎛, respectively. Contact chain resistance(Rc) and junction leakage current (I_{JL}) properties of metal contacts were measured from 10K contact arrays. The Rc of the metal/N^+ active chain was about 150~200Ω and that of metal/P^+ active chain was 700~1000Ω. The I_{JL} values of both N^+/P and P^+/N junctions were about 10-10 A/cm^2 ranges with very small standard deviation. It seemed that the Rc and the I_{JL} were very sensitive to Ti-silicide thickness formed on Si-substrate during the Ti deposition process. If the Ti-silicide thickness was insufficient on contact bottom, Rc values were abnormaly high and IJL values were too low. On the contrary, if it is thicker than an optimal thickness, the trend was vice versa. After all, it was founded optimum condition of Ti-thickness existed in narrow region. TEM results showed the interface between Ti-silicide and Si-substrate was distinct and uniform at the optimum condition. In summary, by refining CVD-Ti/TiN deposition conditions, low R_C and I_{JL} values suitable for giga-bit DRAM level applications were successfully attained

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MOCVD TiN FOR HIGH TEMPERATURE PROCESS, SANG-HYEOB LEE, JEONG-TAE KIM, HWAN-SEOK SEO, MOO-SUNG CHAE, and SAM-DONG KIM (Semiconductor Research Division, HYUNDAI Electronics Ind. Co., Bubal-eub, Ichon-si, Kyungki-do, 461-701, Korea)

MOCVD TiN film was studied as a diffusion barrier between silicon and blanket W as a bit line in DRAM. An elevated temperature of conventional BPSG (borophosphosilicate glass) flow temperature was followed after metal line formation. We observed that insulating SiO_2 layers are introduced between TiN and $TiSi_2$ layers when annealed at 850℃, which were caused by the absorbed oxygen in the TiN film from the atmosphere during the air exposure. In situ multiple plasma treatment of MOCVD-TiN was found to prevent oxygen accumulation in TiN layers, however, diffusion barrier property was degraded by forming WSi_2 already at 700℃. Partially plasma-treated MOCVD-TiN was proposed to produce the robust diffusion barrier where only lower part of TiN layer is plasma-treated. This structure was very stable up to 850℃ -30minutes thermal stress without side effect.

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EFFECTS OF Te-DOPING ON ORDERING AND DOMAIN STRUCTURES IN GaInP OMVPE LAYERS, **R. SPIRYDON, J.H. CHO, T-Y. SEONG (Dept. of Materials Science and Engineering, K-JIST, 506-712 Kwangju, Korea) S.H.LEE AND G.B. STRINGFELLOW, (Dept. of Materials Science and Engineering, University of Utah, UT 84112 Salt Lake City, USA)**

TEM, TED, AFM, photoluminescence (PL) and Hall measurements studies have been carried out to investigate the effects of Te doping on ordering and antiphase boundaries (APBs) in organometallic vapour phase epitaxial GaInP layers grown on on-axis and vicinal (001) GaAs substrates at 670°C. TED and PL results show that the degree of order depends on Te concentrations; a complete disordering is obtained for Te concentrations>$2\times10^{18}cm^{-3}$. The degree of order decreases more rapidly in the vicinal samples than in the on-axis samples. TEM results show that the density of APBs decreases with increasing Te concentration. The shapes of ordered domains are found to be affected by Te concentrations. A simple model is proposed to explain a relationship between step structures, Te concentrations and the degree of order.

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FABRICATION OF DIAMONDLIKE CARBON FIELD EMITTERS USINIG LASER ABLATION TECHNIQUE FOR FIELD EMISSION DISPLAY, H. KIM, J. W. HUH, M. J. KIM and H. S. JEONG(Electronic Materials Lab. Institute for Advanced Engineering, Yongin P.O. BOX 25, Kyonggi-Do, 449-020, Korea)

DLC (Diamondlike Carbon) field emitters were fabricated using laser ablation technique and their field emission characteristics was closely examined for FED application. Our laser ablation system has a main advantage of easy scale up for display application. Light source was a pulsed Nd-YAG laser (λ=1.064 μm) and cylindrical graphite rod was used as a target. There was no substrate heating during DLC formation. Laser power density proved to be a critical factor for obtaining excellent field emission properties of DLC emitters. DLC emitters prepared in the range of 10^{11}~10^{12} watt/cm^2 exhibited less than 10 V/μm of threshold field, more than 100 mA/cm^2 of emission current density. It turned out that non-hydrogenated DLC films by laser ablation could be applied to emitter material of FED. Finally the prototype of 2 inch mono diamond FED was successfully demonstrated.

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