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The chemical analysis about post annealing effect of HfO₂ on Si-passivated GaAs SANG HAN PARK, HYO JIN KIM, DAE-KYONG KIM, MANN-HO CHO, Yonsei Univ., Sinchon-dong, Seodaemun-gu, Seoul, Korea, CHUNG YI KIM, LG Institute, Umyeon-dong, Seocho-gu, Seoul, Korea, HYOUNGSUB KIM, Sungkyunkwan Univ. Natural Sciences Campus, Cheoncheondong, Jangan-gu, Suwon-si, Gyeonggi-do, Korea — In order to develop a high performance MOS device, 3-5 based semiconductors as a high carrier transport semiconductors have been seriously considered. Especially, GaAs with HfO₂ as gate dielectric material attract as a candidate for future MOS FET device. Since, larger trap density at HfO₂/GaAs interface than for HfO₂/Si interface degrade device performance, Si interfacial layer was introduced to reduce interfacial trap. Moreover, Si reduces intrinsic defects at GaAs surface by reconstruct Ga or As homo bonds. In this study, we focused on changes in the chemical and structural characteristics of HfO₂/Si/GaAs film as a function of post annealing temperature. The interfacial reactions induced by post annealing were investigated by XPS, REELS, and XAS. The results show that Si layer decrease the diffusion and oxide formation of Ga and As. Also, the post nitridation significantly improve the diffusion barrier by forming the Ga-N layer. XAS result also consists with the fact that the post nitridation suppress Ga diffusion. The band offsets between GaAs and high-k gate dielectric were aligned using XPS and REELS.

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