Investigation of characteristics for Al/LPD-TiO2/SiGe MOS device

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ABSTRACT

Titanium oxide (TiO2) has been grown on SiGe film by using liquid-phase deposition (LPD) method with (NH4)2TiF6 and H3BO3 at room temperature. In this study, the concentration of (NH4)2TiF6 and H3BO3 were 0.05 and 0.25 M, respectively, and the temperature were 30 ℃. We found that the growth rate increases with the increasing of (NH4)2TiF6 and H3BO3 concentration. The electron spectroscopy of chemical analysis (ESCA) showed that the Ti2p peaks appeared at 458.6 and 464.5 eV.Moreover, the (NH4)2Sx treatment was used to reduce the leakage current of MOS devices. the leakage current density with and without sulfide treatment are 1.35×10-7 and 8.18×10-6 A/cm2 under positive electric field of 1 MV/cm, respectively. The significant reduction of leakage current about 60 was achieved in our study. We also found that TiO2 could be used as an antireflection coating. In this study, by capping a thin TiO2 layer with SiGe film, the photo-to-dark current ratio can be improved form 3.1 to 16.67.

Keywords : liquid-phase deposition, titanium oxide, metal-oxide-semiconductor, (NH4)2Sx

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