B1 13:40-13:55

Low temperature epitaxial growth of 4H-SiC thin films by chemical vapor deposition using bis-trimethylsilylmethane precursor

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Silicon carbide (SiC) is a newly emerging material for high-temperature, high-frequency and high-power devices, since it has a high breakdown field ($\sim 3\times10^6$ V/cm), high thermal conductivity, high saturated electron drift velocity ($\sim 2\times10^7$ cm/s) and chemical stability [1, 2]. Recently 4H-SiC polytype is highlighted for its two times higher electron mobility with its small anisotropy and lower ionization energies of shallow dopants compared to 6H-SiC. We have previously reported that the use of the precursor bis-trimethylsilylmethane (BTMSM, C7H20Si2) resulted in a 150K reduction in the deposition temperature for 3C-SiC and α-SiC on Si and 3.5 off-axis α-SiC substrate, respectively [3-6].

In this paper, we report the experimental results on the growth of 4H-SiC homoepitaxial films on 4H-SiC $(11\bar{2}0)$ substrate using an organo-silicon source material, BTMSM. 4H-SiC homoepitaxial films was successfully grown at a low temperature of 1200℃. To author's knowledge, this deposition temperature is the lowest one reported up to now.

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