Investigation on the electric characteristics of 2 dimensional β-phase Ga_2O_3 based field effect

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β phase Ga_2O_3 (β-Ga_2O_3) has recently gained a lot of interest for applications in high power devices, solar-blind photodetectors, and gas sensors. The interest stems from its intrinsic material properties, such as wide bandgap nature of 4.9 eV and high breakdown electric field of 8 MV cm^{-1}, leading to making its devices more efficient with small size dimensions for high power device and harsh environmental sensor. The wide bandgap nature enables Ga_2O_3 based electronic devices to operate at high temperatures due to its low intrinsic carrier concentration. The large lattice constant of 12.23 Å of β-Ga_2O_3 along [100] direction enables to achieve the facile cleavage of β-Ga_2O_3 crystal into 2-dimensional flake though β-Ga_2O_3 is not a Van der Waals material. The thin channel of Ga_2O_3 flake is beneficial to the FET (field effect transistor) type gas sensor. In this study, the electric characteristics of 2 dimensional β-Ga_2O_3 flake base field effect transistor was investigated by the device simulation, and the results were compared with that of the fabricated device.