ABSTRACT

HEMT is nothing but High Electron Mobility Transistor, also known asheterostructureFET (Field Effect Transitor) or Modulation- Doped FieldEffect Transistor incorporating a junctionbetween two materials with different band gaps as the channel instead of a doped region. Although high- speed operation is attainable using GaN or GaAs , product performance is limited where a high breakdown field and thermal conductivity is needed.ZnO has emerged available candidate to challenge and perhaps overtake. GaAs and GaN as the dominant semiconductor in RF products,particularlypower amplifiers. This is due to its high breakdown field, high thermal conductivity.ZnO possess other material parameter values that are favorable to exixting technologies such as calculating surface potential etc.On a worldwide scale , researchers and industry experts continue towork on the modeling of ZnO – based HEMT devices in hope that ZnO can be used commercially in the near future.A model for a dual- material gate MgZnO/ZnOHigh Electron MobilityTransistorhas been developed by a finite difference method. The method permits the modeling of dual materialas two individual single materials by splitting the 2-D Poisson equation into two separate1-D equations.The model of two separate 1-D equations is formed by applying the boundary conditions. The proposed model estimates the surface potential,channel potential, and drain current by considering the work functions of two metal gates, their length difference and applied drain voltage.The model can be verified using Technology Computer Aided Design (TCAD) simulations.