SDEVICE COMMANDS

File {

      Grid = "@tdr@"

      Current = "@plot@"

      Plot = "@tdrdat@"

      Output = "@log@"

}

Electrode {

      { Name = "source"      Voltage = 0.0 Resist = 20}

      { Name = "drain"      Voltage = 0.0 Resist = 20}

      { Name = "gate"      Voltage = 0.0 Workfunction = 4.2}

      { Name = "bulk"      Voltage = 0.0}

}

Physics {

      Mobility(

      DopingDependence HighFieldSaturation Enormal

      )

      EffectiveIntrinsicDensity (

      )

      eQuantumPotential

}

Plot {

      Doping DonorConcentration AcceptorConcentration

      ElectricField/Vector Potential

      SpaceCharge

      BandGap EffectiveBandGap BandGapNarrowing ElectronAffinity

      ConductionBandEnergy ValenceBandEnergy

      eDensity hDensity

      eDriftVelocity/Vector hDriftVelocity/Vector

      EffectiveIntrinsicDensity IntrinsicDensity

      eQuasiFermiEnergy hQuasiFermiEnergy

      eGradQuasiFermi/Vector hGradQuasiFermi/Vector

      eMobility hMobility eVelocity hVelocity

      Current/Vector eCurrent/Vector hCurrent/Vector

      eBand2BandGeneration hBand2BandGeneration Band2BandGeneration

      eAvalanche hAvalanche Avalanche

      SRHrecombination

      tSRHrecombination

      eQuantumPotential

}

Math {

      Extrapolate

      Derivatives

      -RelErrControl

      Digits = 20

      Error (electron) = 1e8

      Error (hole) = 1e8

      eDrForceRefDens = 1e10

      hDrForceRefDens = 1e10

      Iterations = 20

      Method = ParDiSo

      Direccurrent

      Wallclock

      CNormPrint

      NoSRHperPotential

}

Solve {

      Coupled { Poisson eQuantumPotential }

      Coupled { Poisson eQuantumPotential Electron Hole}

      Quasistationary (

       InitialStep = 1e-2

       MinStep = 1e-3 MaxStep = 0.005

       Goal { Name = "drain" Voltage = @VD@ }

       plot { range= (0,1) intervals =1 }

      )

{ Coupled { Poisson eQuantumPotential Electron Hole } }

 NewCurrentPrefix="IdVg\_"

  Quasistationary (

      DoZero

      InitialStep = 1e-2

      MinStep = 1e-3 MaxStep = 0.005

      Goal { Name = "gate" Voltage = @VG@}

      plot { range = (0,1) intervals = 1 }

)

{Coupled { Poisson eQuantumPotential Electron Hole }

}

}

; =====================

; File Paths and Outputs

; =====================

File {

Grid = "@tdr@" ; Input grid file

Current = "@plot@" ; File to store current results

Plot = "@tdrdat@" ; File to store plotting data

Output = "@log@" ; Log file for simulation details

}

; ====================

; Electrode Definitions

; ====================

Electrode {

{ Name = "source" Voltage = 0.0 Resist = 20 } ; Source contact, grounded, with resistance

{ Name = "drain" Voltage = 0.0 Resist = 20 } ; Drain contact, grounded, with resistance

{ Name = "gate" Voltage = 0.0 Workfunction = 4.2 } ; Gate contact with work function defined

{ Name = "bulk" Voltage = 0.0 } ; Bulk contact, grounded

}

; =========================

; Physics Models Definitions

; =========================

Physics {

Mobility (

DopingDependence HighFieldSaturation Enormal ; Mobility includes doping effects and high-field saturation

)

EffectiveIntrinsicDensity ( ; Effective intrinsic density model

)

eQuantumPotential ; Include quantum potential effects for electrons

}

; =========================

; Plot Data Configuration

; =========================

Plot {

; Doping profiles

Doping DonorConcentration AcceptorConcentration

; Electric properties

ElectricField/Vector Potential SpaceCharge

; Band properties

BandGap EffectiveBandGap BandGapNarrowing ElectronAffinity

ConductionBandEnergy ValenceBandEnergy

; Carrier densities

eDensity hDensity

; Drift velocities

eDriftVelocity/Vector hDriftVelocity/Vector

; Intrinsic densities

EffectiveIntrinsicDensity IntrinsicDensity

; Quasi-Fermi levels

eQuasiFermiEnergy hQuasiFermiEnergy

; Gradients of Fermi levels

eGradQuasiFermi/Vector hGradQuasiFermi/Vector

; Mobilities and velocities

eMobility hMobility eVelocity hVelocity

; Currents

Current/Vector eCurrent/Vector hCurrent/Vector

; Generation and recombination rates

eBand2BandGeneration hBand2BandGeneration Band2BandGeneration

eAvalanche hAvalanche Avalanche

SRHrecombination tSRHrecombination

; Quantum effects

eQuantumPotential

}

; ============================

; Mathematical Solvers Settings

; ============================

Math {

Extrapolate ; Enable extrapolation for better convergence

Derivatives ; Use derivatives for solving equations

-RelErrControl ; Disable relative error control for robustness

Digits = 20 ; Precision digits

Error (electron) = 1e8 ; Error tolerance for electrons

Error (hole) = 1e8 ; Error tolerance for holes

eDrForceRefDens = 1e10 ; Reference density for electron forcing

hDrForceRefDens = 1e10 ; Reference density for hole forcing

Iterations = 20 ; Maximum number of solver iterations

Method = ParDiSo ; Use ParDiSo solver

Direccurrent ; Enable direct current computation

Wallclock ; Track wall-clock time

CNormPrint ; Print convergence norm

NoSRHperPotential ; Disable per-potential SRH recombination

}

; ============================

; Solve Commands and Goals

; ============================

Solve {

; Solve Poisson equation with quantum potential

Coupled { Poisson eQuantumPotential }

; Solve for Poisson, quantum potential, and carriers

Coupled { Poisson eQuantumPotential Electron Hole }

; Quasi-static simulation for drain voltage sweep

Quasistationary (

InitialStep = 1e-2 ; Initial voltage step size

MinStep = 1e-3 ; Minimum voltage step size

MaxStep = 0.005 ; Maximum voltage step size

Goal { Name = "drain" Voltage = @VD@ } ; Sweep goal: drain voltage

plot { range = (0,1) intervals = 1 } ; Plot settings

)

{

Coupled { Poisson eQuantumPotential Electron Hole }

}

; Quasi-static simulation for gate voltage sweep

NewCurrentPrefix = "IdVg\_" ; Prefix for output files

Quasistationary (

DoZero ; Start from zero voltage

InitialStep = 1e-2 ; Initial voltage step size

MinStep = 1e-3 ; Minimum voltage step size

MaxStep = 0.005 ; Maximum voltage step size

Goal { Name = "gate" Voltage = @VG@ } ; Sweep goal: gate voltage

plot { range = (0,1) intervals = 1 } ; Plot settings

)

{

Coupled { Poisson eQuantumPotential Electron Hole }

}

}