Contribution ID: **28** Type: **not specified**

深亚微米工艺低温特性解析模型研究

Saturday, 27 November 2021 09:42 (18 minutes)

Summary

In order to integrate CMOS readout circuit at the proximal end of the high-purity germanium detector at low temperature to realize high-resolution nuclear detection technology, the existing simulation model can not meet the low-temperature design requirements because the temperature application range of the existing simulation model is 223k ˜ 423K, and the model is not analyzed in the currently publicly reported research results of physical modeling of low-temperature CMOS process, Based on the physical mechanism of threshold voltage and carrier mobility temperature effect, an analytical model of 4K ˜ 423K deep submicron process threshold voltage is established by piecewise linearization, principal term approximate integration method and boundary conditions at room temperature. In the process of obtaining the boundary conditions at room temperature, based on the threshold voltage expression of uniformly doped long channel devices, the effects of transverse and longitudinal non-uniform doping and leakage induced barrier drop effect are considered respectively. The general formula of constant temperature boundary conditions is obtained by solving the simplified quasi Poisson equation in the depletion region. In actual use, the four factors contained in the general formula can be obtained through testing for different processes. At SMIC 0.18 μ Compared with the simulation results of MEDICI software under m process, it is found that the model is very consistent, which verifies the feasibility of low temperature modeling method.

Primary authors: Mr 刘, 海峰 (中国原子能科学研究院); Prof. 何, 高魁 (中国原子能科学研究院)

Presenter: Mr 刘, 海峰 (中国原子能科学研究院)