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器件制备技术及器件物理

多晶硅薄膜晶体管亚阈值区准二维模型

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摘要:

从准二维泊松方程出发,结合多晶硅扩散和热发射载流子输运理论,建立了多晶硅薄膜晶体管亚阈值电流模型。由表面势方程及亚阈值电流方程求得包含陷阱态和晶粒尺寸的亚阈值斜率解析表达式。模型具有简明的表达式,并且在大晶粒和低陷阱态情形下可简化为传统长沟道MOSFET亚阈值区模型。仿真结果与试验数据符合得很好,验证了模型的正确性。

关键词: 多晶硅薄膜晶体管 亚阈值 准二维

Quasi-Two-Dimensional Subthreshold Current Model for Polysilicon Thin Film Transistors

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Abstract:

Based on the diffusion and thermal emission processes, an analytical subthreshold current model for polysilicon thin film transistors (poly-Si TFTs) is developed by a quasi- two-dimensional solution. An analytical expression of the subthreshold swing is subsequently obtained from the surface potential equation and the subthreshold current expression, which takes into account the grain size and trap states. This model has a simple functional form and it can reduce to that of the conventional long channel MOSFET in the case of large grain size and low trap states. The model has been verified by a good agreement between simulated results and experimental data.

Keywords: polysilicon thin-film transistors subthreshold quasi-two-dimensional

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