Primer on Semiconductors: Lecture 2.3 Short Problem

Mark Lundstrom
Purdue University, Fall 2018

Provide a numerical answer to the question below.

Traditionally, SiO_2 has been used as the gate dielectric for MOS transistors. As transistor dimensions scaled down to pack more transistors per chip, the thickness of the SiO_2 had to be reduced. It turns out that an SiO_2 thickness of 1 nm is too thin; it results in too much gate current. Answer the following question.

- **Compute the electron transmission of an SiO_2 layer that is 1 nm thick**.

Use our expression for the transmission of a tunnel barrier,

,

and assume that the barrier height is

.

You may also assume that the effective mass is .