

Towards to a new radiation damage model for Synopsys TCAD

Thursday 3 December 2015 16:20 (20 minutes)

For the high luminosity phase of the Large Hadron Collider (HL-LHC) at the expected position of the innermost pixel detector layer of the CMS experiment the estimated equivalent fluence after 3000 fb^{-1} is $2 \cdot 10^{16} \text{ neq/cm}^2$, and the IEL (Ionizing Energy Loss) dose in the SiO_2 is 5 MGy. The optimization of the pixel sensors and the understanding of their performance as a function of fluence and dose requires implementing a realistic radiation damage model in TCAD simulation. So far the simulations cannot explain simultaneously dark current, electrical field and charge collection efficiency. In addition, they have not been validated for such high fluences.

Therefore, to judge the validity of the currently available models used in the particle physics community, a comparison of the simulation results with I-V, C-V and CCE measurements of irradiated diodes will be presented and some new ideas toward a radiation damage model which accurately describes available data will be discussed.

Primary author: SCHWANDT, Joern (Hamburg University (DE))

Presenter: SCHWANDT, Joern (Hamburg University (DE))

Session Classification: Simulations