A model for neutron radiation damage in Metal Oxide Semiconductor (MOS) structures

Abstract

Neutron bombardment on semiconductor material causes defects, one such primary physical effect is the formation of displacement defects within the crystal lattice structure, and such defects effectively decrease the mean free path and thus shorten the recombination time. Ionizing radiation causes creation of electron-hole pair in the gate oxide and in parasitic insulating layers of the MOS devices. Calculations show increase of the dark current in depletion region caused by a single neutron. Determination of energy and angular distribution of primary knock on atoms, with 14 MeV neutron irradiation in silicon are presented.