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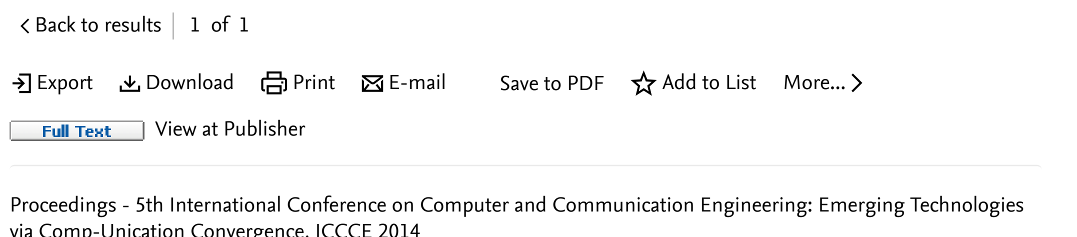

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3MeV-electron beam induced threshold voltage shifts and drain current degradation on ZVN3320FTA & ZVP3310FTA commercial MOSFETs (Conference Paper)

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Abstract

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Spacecraft, military mission requires electronic devices that are radiation hardened to extend exposure to ionizing radiation. Among many other semiconductors MOSFET is highly targeted due to its switching and amplifying application in electronics devices. This study investigates threshold voltage shifts and drain current degradation mechanism for both P-channel and N-channel commercial Si MOSFET subjected to low doses of electron beam radiation. It is observed that at lower dose of electron beam radiation, the mechanism responsible for threshold voltage shifts is generation-recombination of electron - hole pair. For the N-channel device positive threshold voltage shifts were observed and negative threshold voltage shifts were found in the P - channel device. Electron radiation induced defect states act as traps for drain current degradation. Experiment data to the above mention samples revealed that generation of electron-hole pair and built of traps centers creates the defects such as threshold voltage shifts and drain current degradation. These defects are obtained due to the penetration of 3MeV energy of electron beam dose level from 50KGy to 250KGy. The irradiated devices were evaluated through its shifts in the current and voltage characteristics, results were analyzed and plotted for the both N-channel and P-channel MOSFET. © 2014 IEEE.

Author keywords

charge traps   electrical characterization   electron hole pair generation

Indexed keywords

Engineering controlled terms: Defects   Degradation   Drain current   Electron beams   Electron devices   Electrons   Field effect transistors   Ionizing radiation   MOSFET devices

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