Contribution ID: **320** Type: **Poster Presentation**

Gadolinium doped and undoped silicon detectors for radiation sensing in high energy physics experiments

Tuesday, 26 June 2018 15:00 (2 hours)

Silicon radiation detectors are widely used in high energy and nuclear physics experiments hence they incur radiation damage. This leads to degradations in detector performance which include increases in leakage current, bulk resistivity and space charge concentration. The increase in space charge concentration is particularly damaging since it significantly increases the sensor's full depletion voltage, causing either breakdown if operated at high biases or charge collection loss if operated at lower biases than full depletion. The detectors have also been found to be conductivity type inverted after the damage from n-type to apparent p-type. The damage is also responsible for a negative capacitance in forward bias and a low voltage peak in reverse bias of the detector.
The results of these parameters have not been fully understood and thus the effects of radiation on silicon devices still need to further studied.
The doping (defect engineering) of silicon with lifetime killers such as gold and platinum generates defects that are responsible for suppression of radiation effects. They create "mid-gap defects" in the band-gap of silicon. The metals are however expensive and not easily available for research.
Gadolinium is a rare earth metal that is going to be used to generate defects in silicon. Gadolinium is very reactive and ferromagnetic with large net moment due to its half full f shell. Therefore it is important to study silicon doped gadolinium to understand the diffusion mechanisms of the metal.

Key words: Si detector, radiation damage, gadolinium doped silicon radiation detectors.

Please confirm that you
have carefully read the
abstract submission instructions
under the menu item
"Call for Abstracts"
(Yes / No)

Yes

Consideration for
student awards
Choose one option
from those below.
N/A
Hons
MSc
PhD

PhD

Supervisor details
If not a student, type N/A.
Student abstract submision
requires supervisor permission:
please give their name,
institution and email address.

Moloi SJ
moloisj@unisa.ac.za

Primary author: Mr SITHOLE, THOKOZANE MOSES (UNIVERSITY OF SOUTH AFRICA)

Co-author: Mr MOLOI, Sabata (University of South Africa)

Presenter: Mr SITHOLE, THOKOZANE MOSES (UNIVERSITY OF SOUTH AFRICA)

Session Classification: Poster Session 1

Track Classification: Track B - Nuclear, Particle and Radiation Physics