Variability Analysis of Graded Channel Dual Material-double Gate Strained-silicon MOSFET With fixed Charges

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Research Article

Keywords: Contact resistance fluctuations, Line edge roughness, Oxide thickness fluctuations, Random dopant fluctuations, Strained-Silicon, Threshold voltage

Posted Date: April 16th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-412530/v1

Version of Record: A version of this preprint was published at Journal of Computational Electronics on January 15th, 2022. See the published version at https://doi.org/10.1007/s10825-021-01847-9.

Abstract

In this paper, variability analysis of graded channel dual material (GCDM) double gate (DG) strained-silicon (s-Si) MOSFET with fixed charges is analyzed with the help of Sentaurus TCAD. By varying the different device parameters, the variability analysis of the proposed GCDM-DG s-Si MOSFET is performed with respect to variations in threshold voltage and drain current as the line edge roughness and fluctuations in random dopant, contact resistance, and oxide thickness are considered. The results confirm that the effect of process variations is severe when the device has fixed charges at oxide interface. Moreover, the proposed GCDM-DG s-Si p-MOSFET has less vulnerable to the effects of line edge roughness, fluctuations in oxide thickness and random dopants in comparison with the proposed GCDM-DG s-Si n-MOSFET.

Full-text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

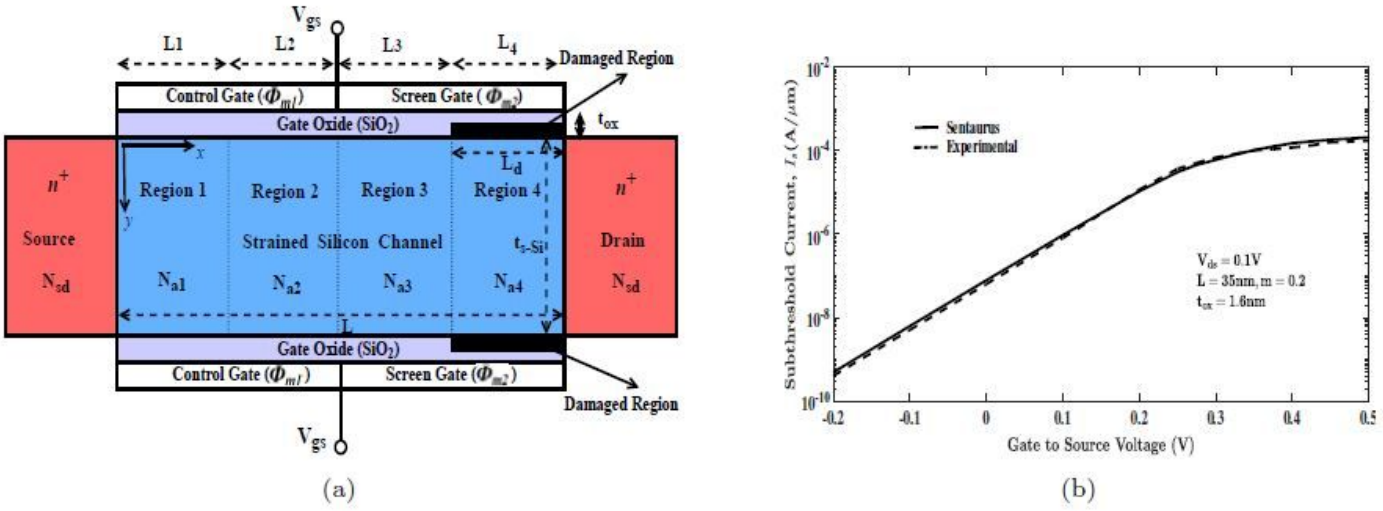

Figure 1

Symmetrical GCDM-DG s-Si MOSFET xed charges a. Proposed MOSFET structure b. Calibration of transfer characteristics of the s-Si device with experimental results of [21].

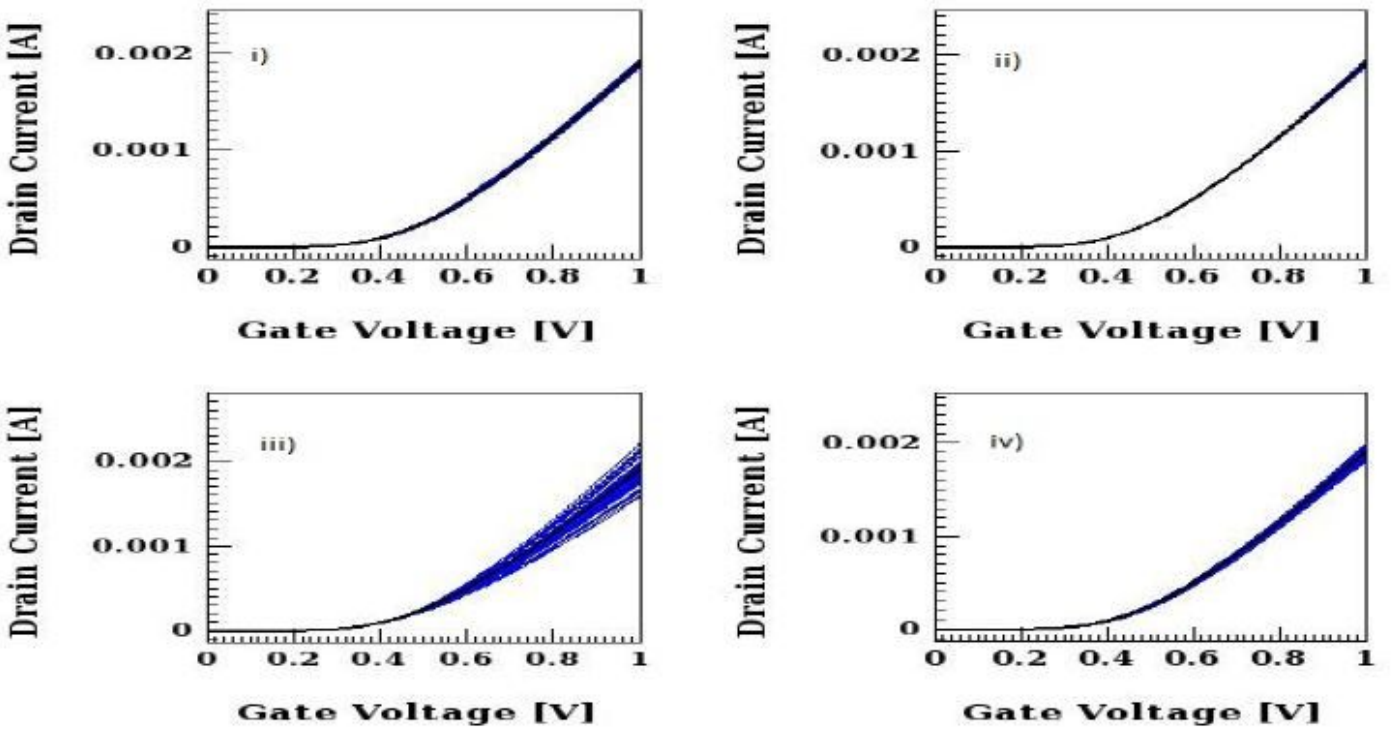

Figure 2

Variation of transfer characteristics of GCDM- DG s-Si n-MOSFET with L= 20 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

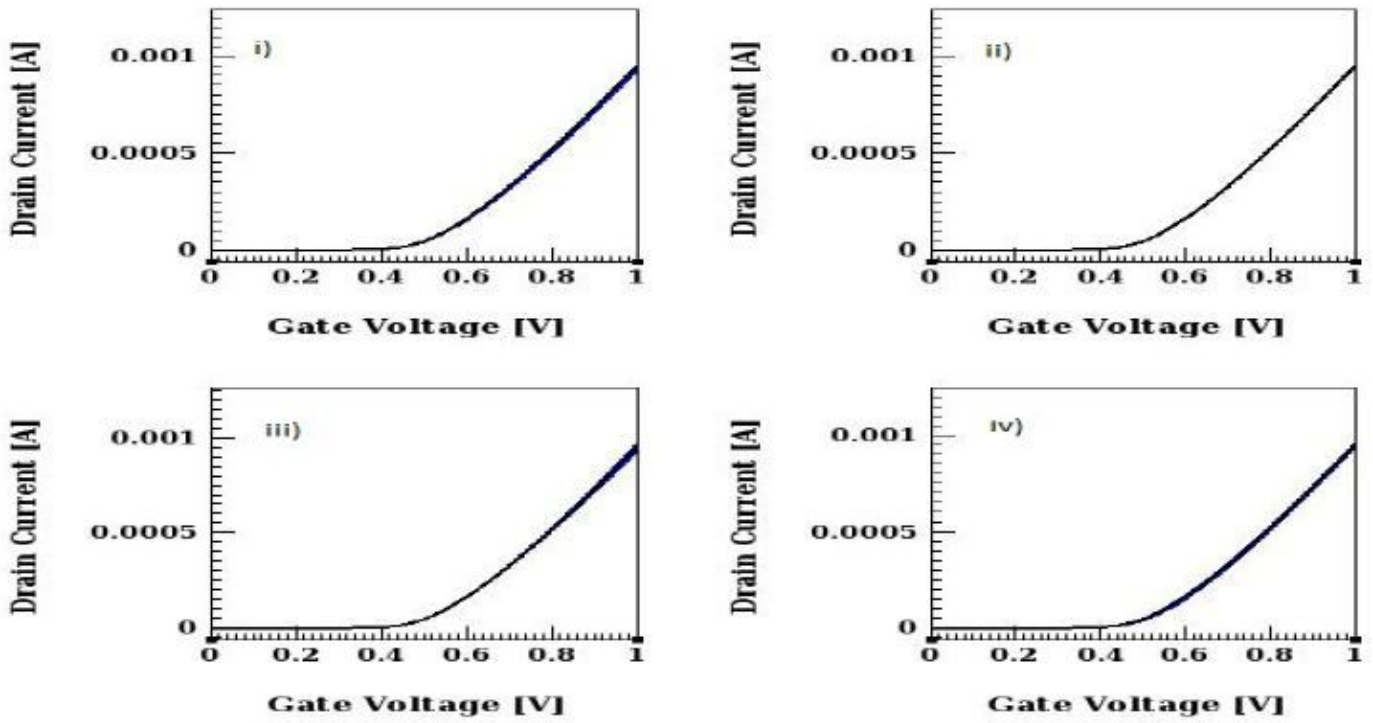

Figure 3

Variation of transfer characteristics of GCDM-DG s-Si n-MOSFET with L= 40 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

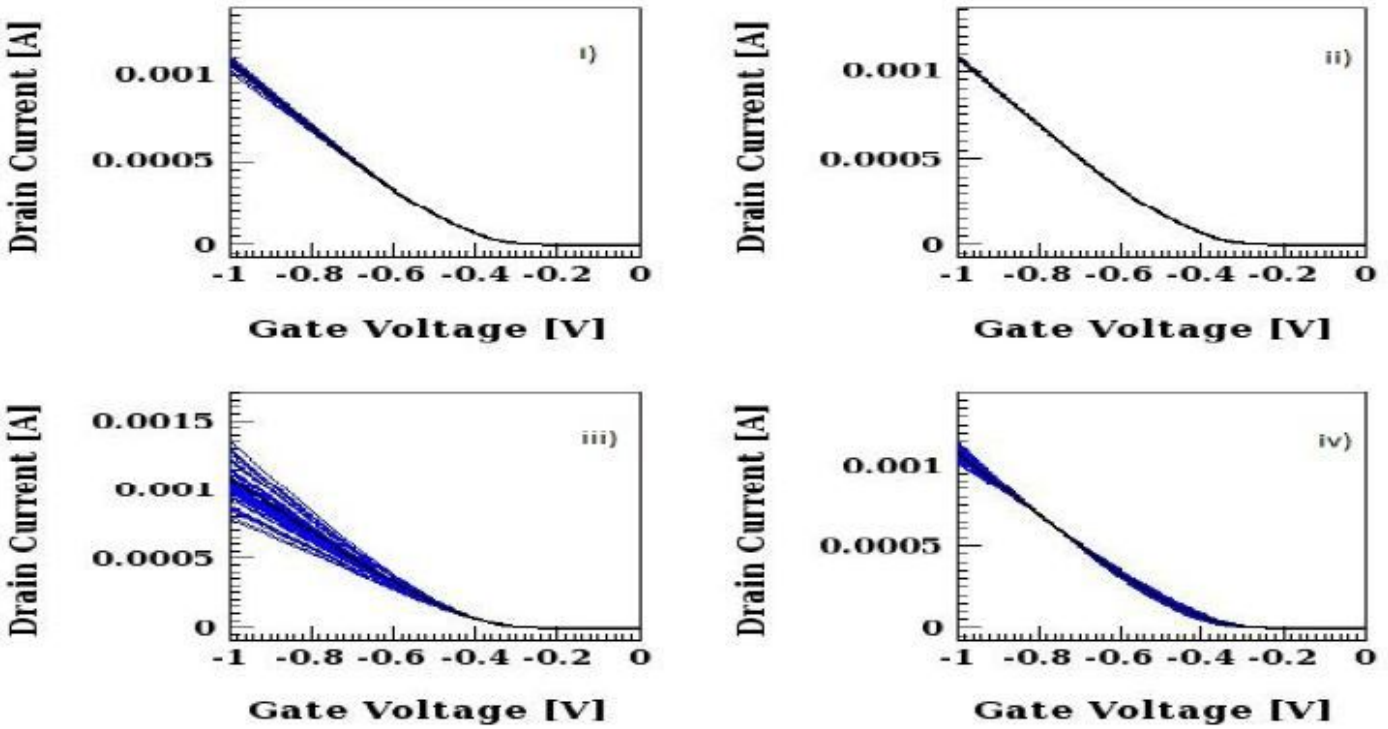

Figure 4

Variation of transfer characteristics of GCDM-DG s-Si p-MOSFET with L= 20 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

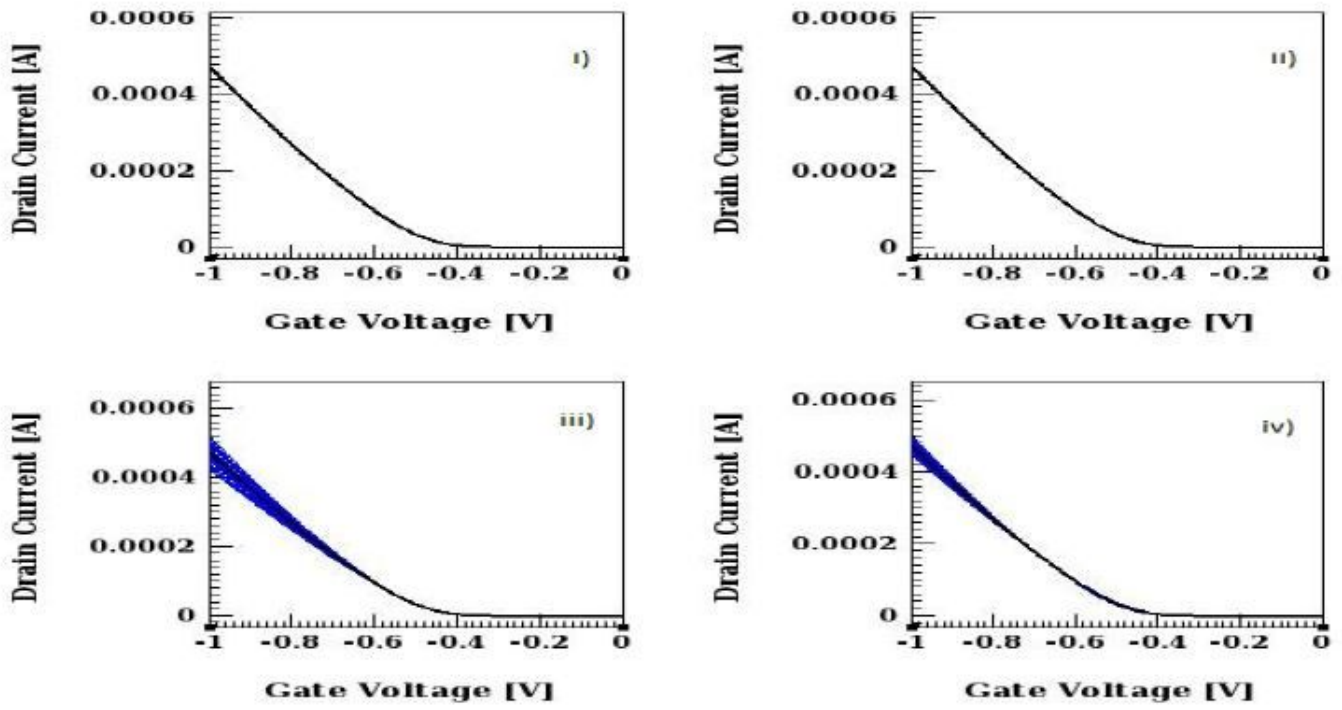

Figure 5

Variation of transfer characteristics of GCDM-DG s-Si p-MOSFET with L= 40 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

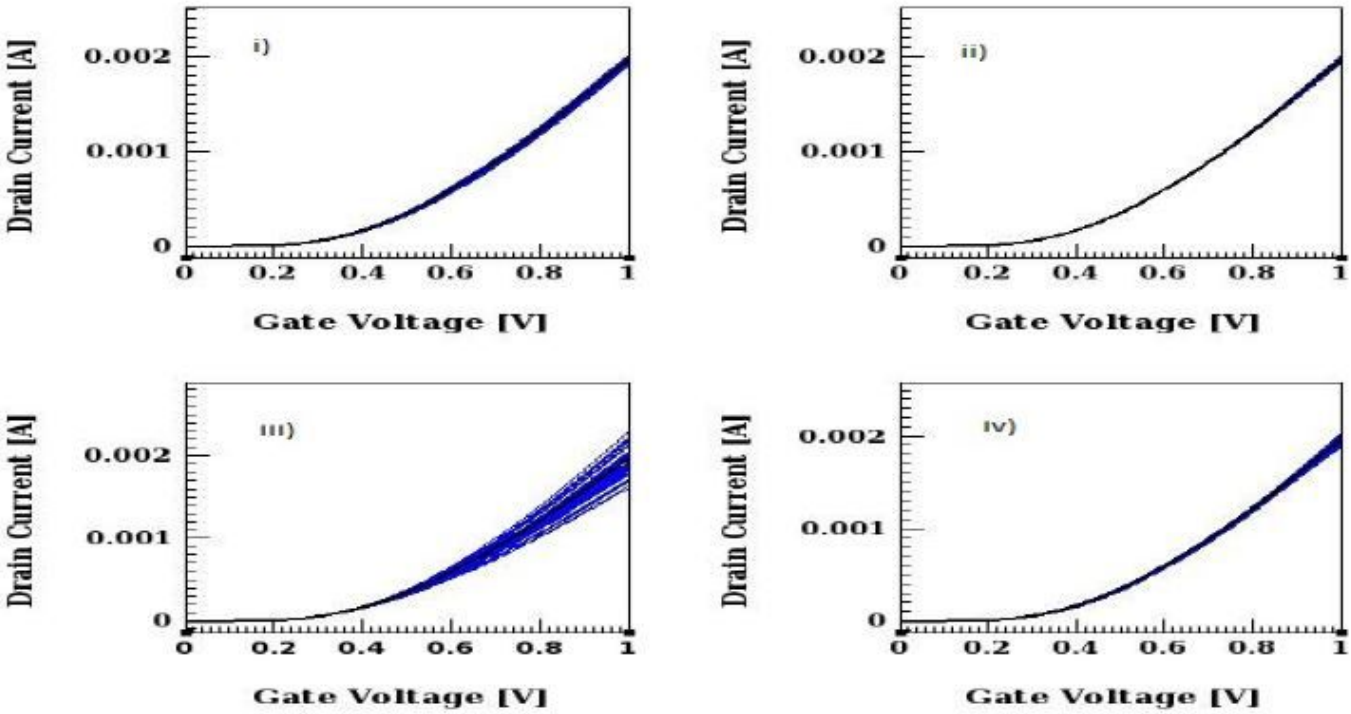

Figure 6

Variation of transfer characteristics of GCDM-DG s-Si n-MOSFET with m= 0.3 due to i) RDF, ii) OTF, iii) CRF, iv) LER.

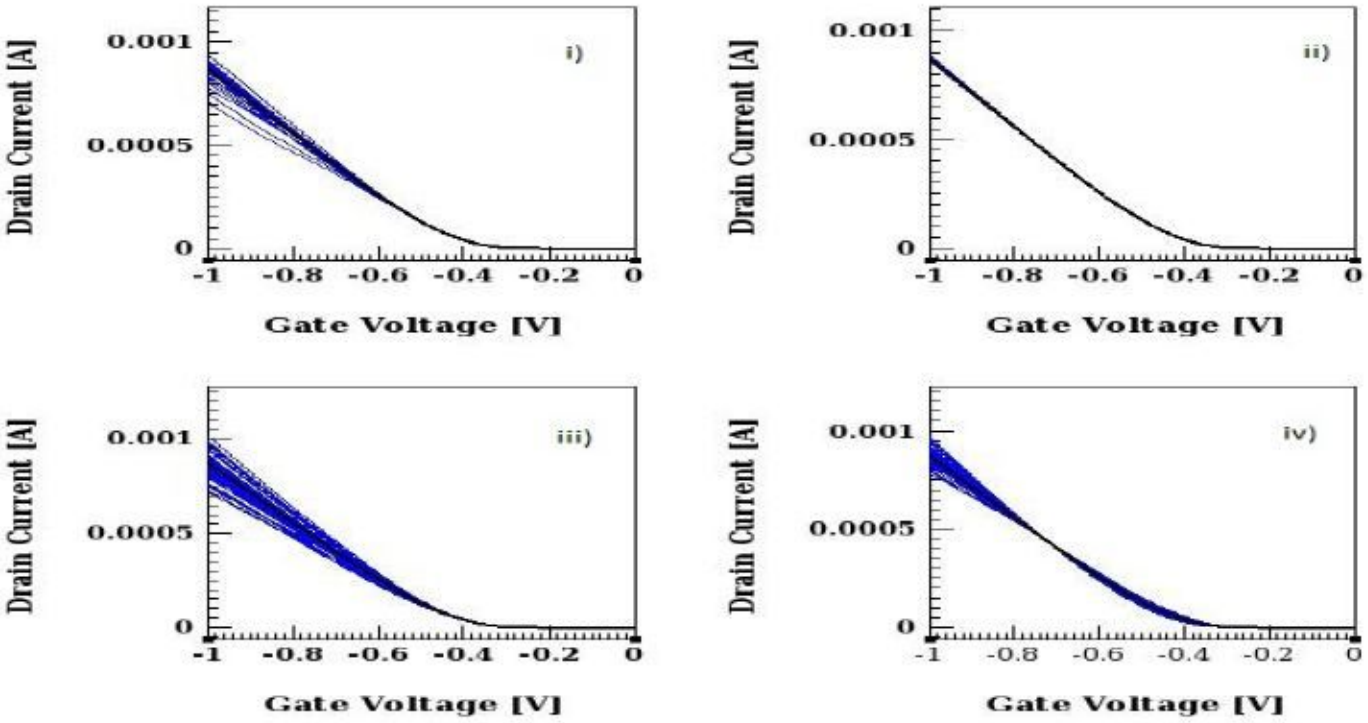

Figure 7

Variation of transfer characteristics of GCDM-DG s-Si p-MOSFET with m= 0.3 due to i) RDF, ii) OTF, iii) CRF, iv) LER.

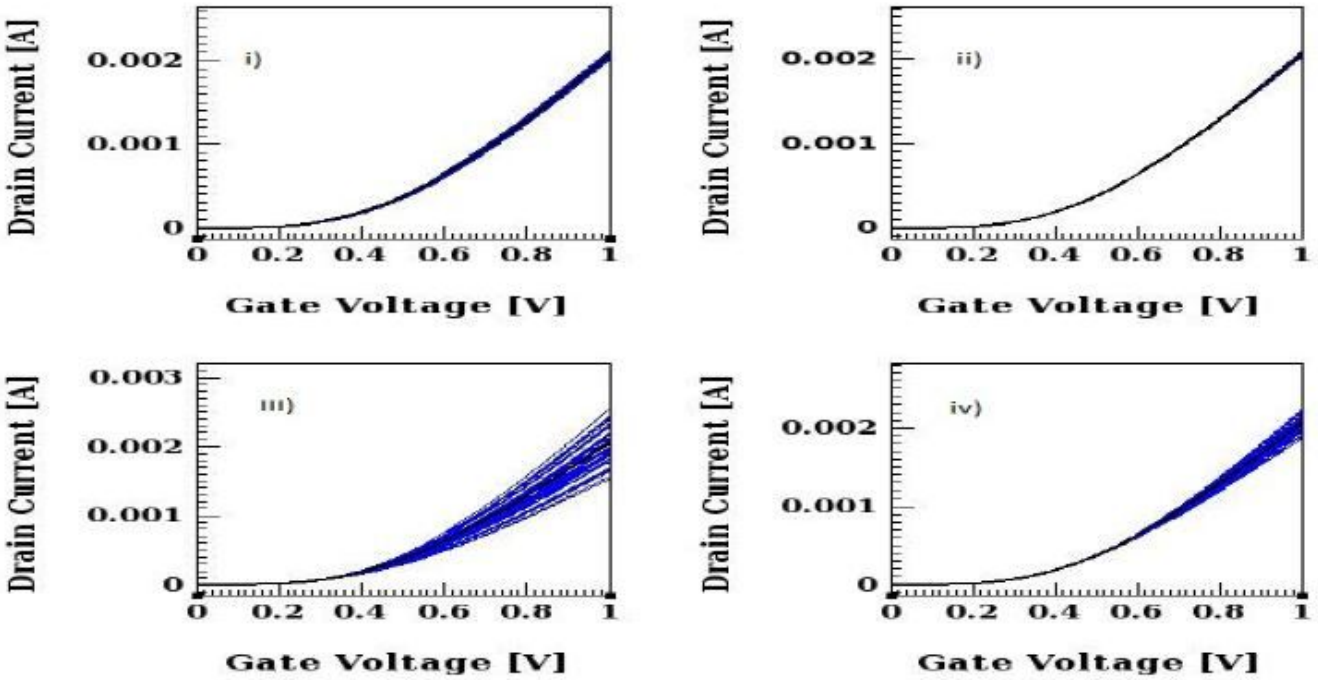

Figure 8

Variation of transfer characteristics of GCDM- DG s-Si n-MOSFET with tox= 2 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

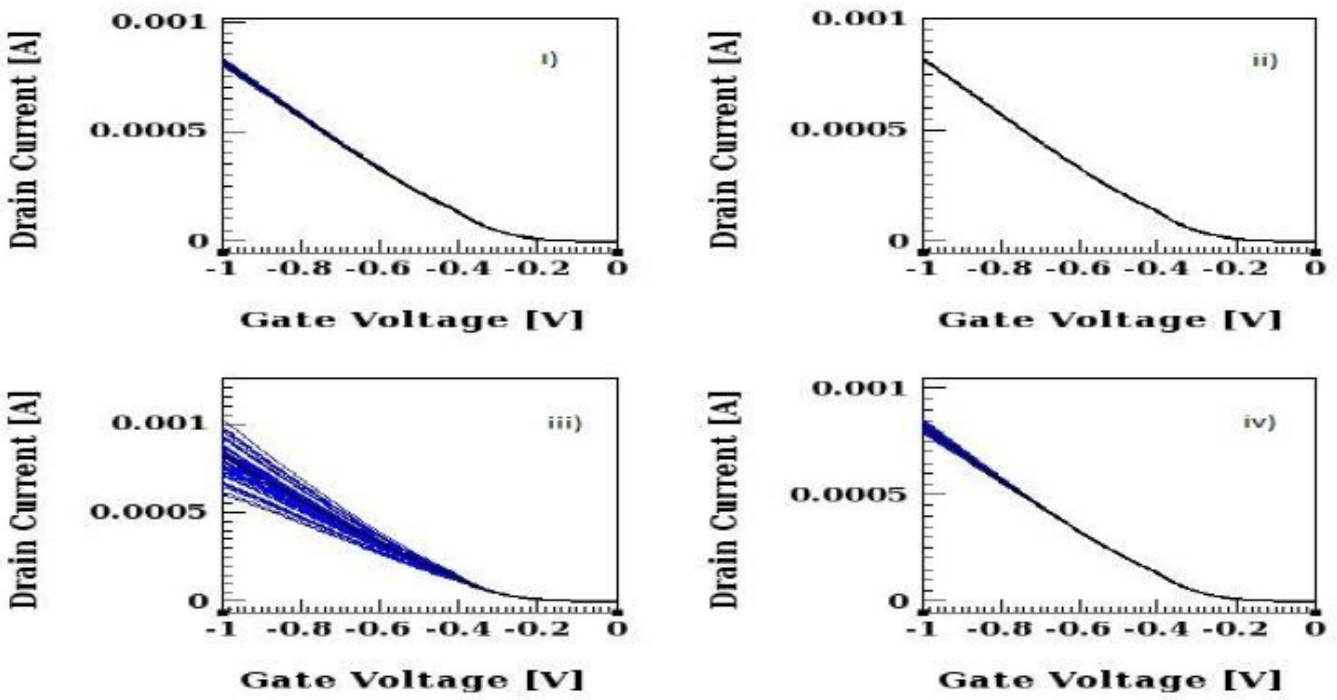

Figure 9

Variation of transfer characteristics of GCDM- DG s-Si p-MOSFET with tox= 2 nm due to i) RDF, ii) OTF, iii) CRF, iv) LER.

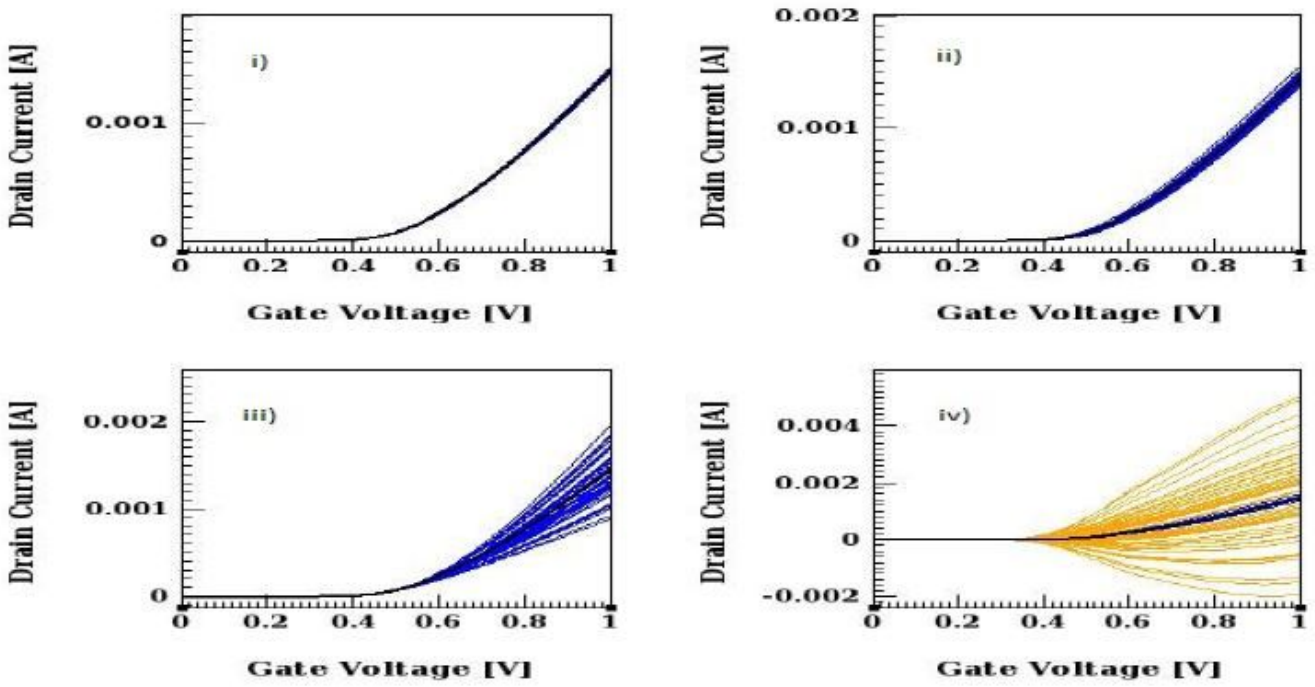

Figure 10

Variation of transfer characteristics of GCDM- DG s-Si n-MOSFET with Nf= -4*1012 due to i) RDF, ii) OTF, iii) CRF, iv) LER.

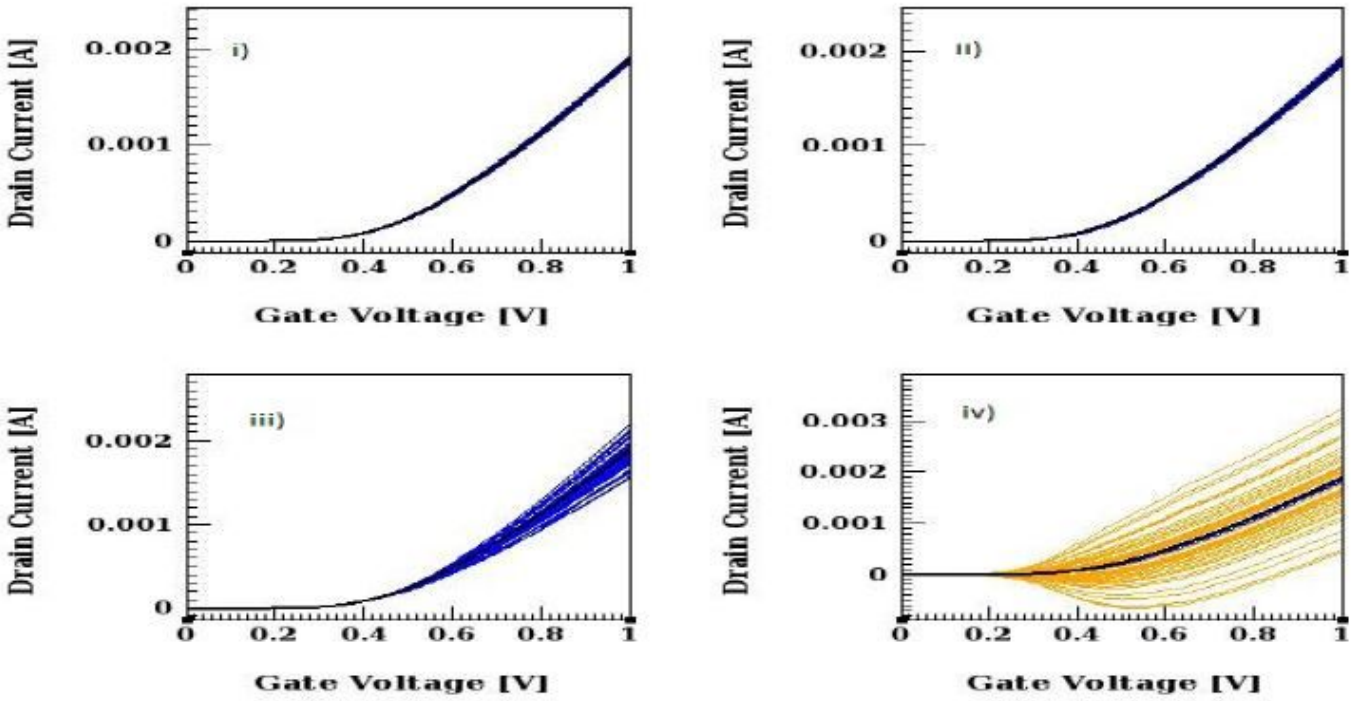

Figure 11

Variation of transfer characteristics of GCDM- DG s-Si n-MOSFET with Nf= 4*1012 due to i) RDF, ii) OTF, iii) CRF, iv) LER.

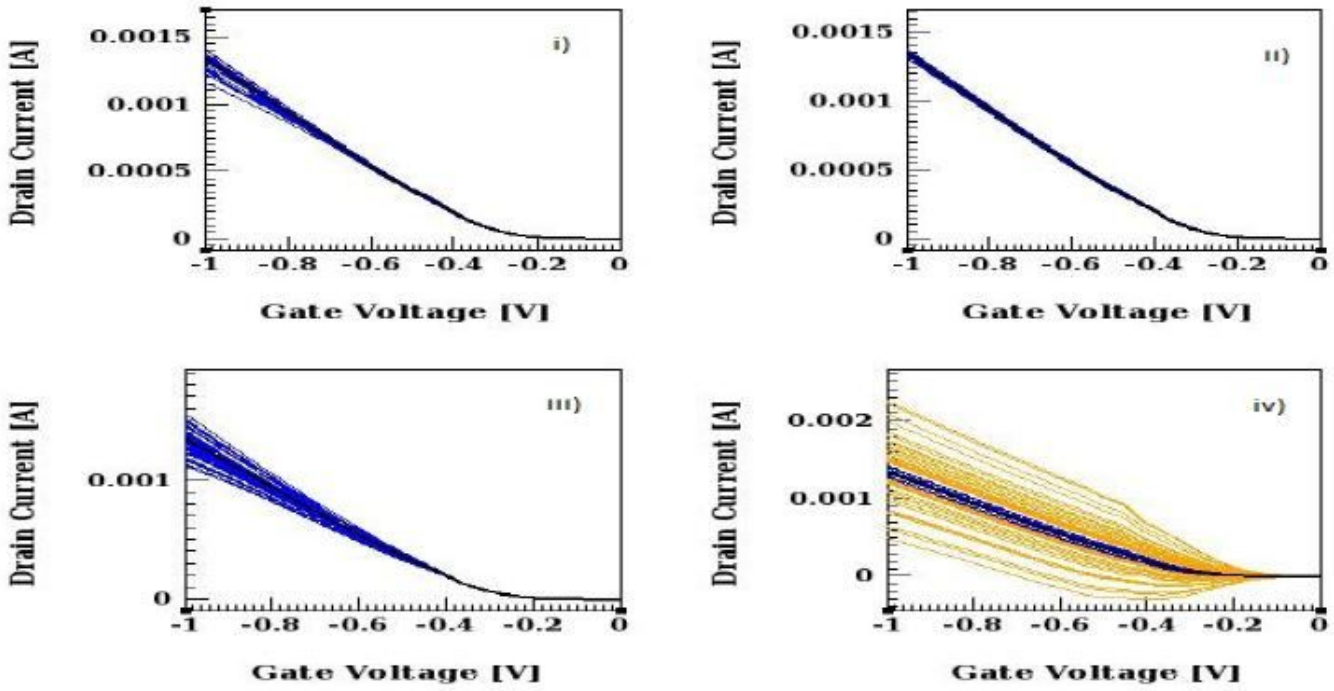

Figure 12

Variation of transfer characteristics of GCDM- DG s-Si p-MOSFET with Nf= -4*1012 due to i) RDF, ii) OTF, iii) CRF, iv) LER.

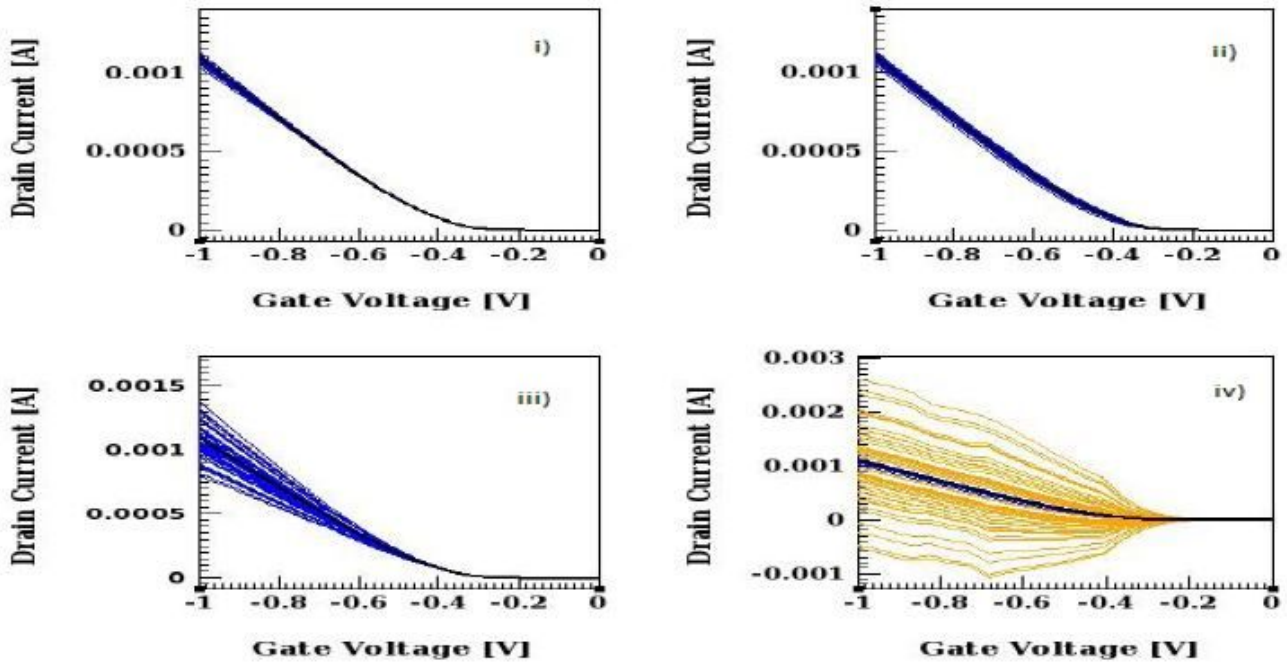

Figure 13

Variation of transfer characteristics of GCDM- DG s-Si p-MOSFET with Nf= 4*1012 due to i) RDF, ii) OTF, iii) CRF, iv) LER.