AMDE

Reliability Modeling on 90 nm n-channel MOSFETs with BSIM4 Dedicated to HCI Mechanisms

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  The final purpose of this study is to model the drain current and 1/f noise degradation characteristics of n-channel MOSFETs. In this report, we present the implementation of Hot Carrier Degradation into drain current equations of BSIM4 model.

  Then, the simulations of the DC drain current degradation will be demonstrated. 1/f noise voltage density simulation affected by the drain current degradation will also be shown.

BSIM4 model parameters have been extracted extensively with measured data including I-V and 1/f noise measurement of our TEGs.

  Fig.1 and Fig.2's measured value, which is dot marked, is identical. Solid line represents fresh and degraded simulation data.

In this way, we show the characterizations of before and after the degradation.
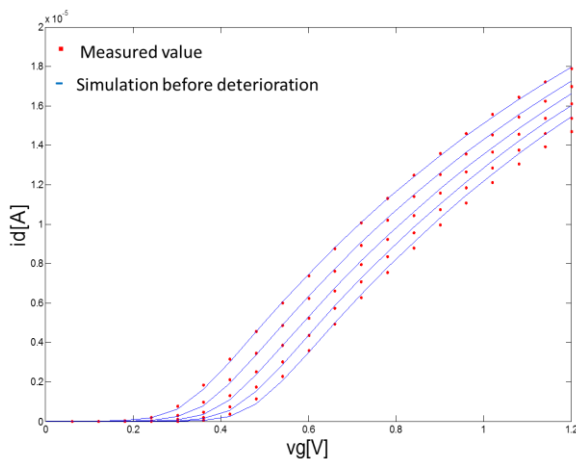

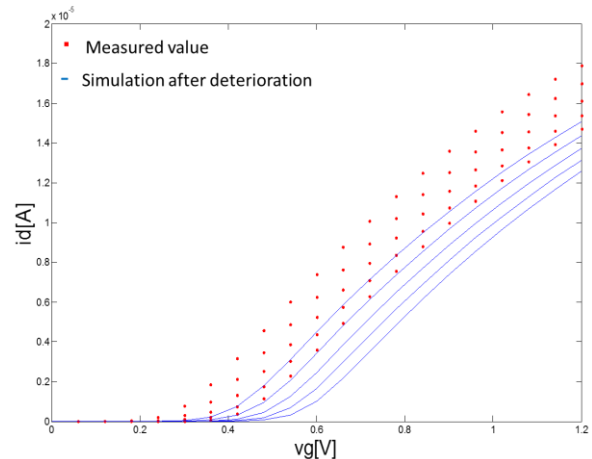Fig. 1. I_{DS} vs. V_{GS} characterizations of fresh n-MOSFET

Fig. 2. I_{DS} vs. V_{GS} characterizations of degraded n-MOSFET

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