

In FinFET technology, PFET has worse hot carrier injection (HCI) degradation under higher temperatures than NFET. The new observation is due to the coupled self-heating effect (SHE) in the fins during HC HCI. Using low duty pulses to stress can decouple the SHE and HCI, and restore the degradation at the test temperature. A flow of reliability aging and a self-heating verification process are then suggested for robust circuit qualification.

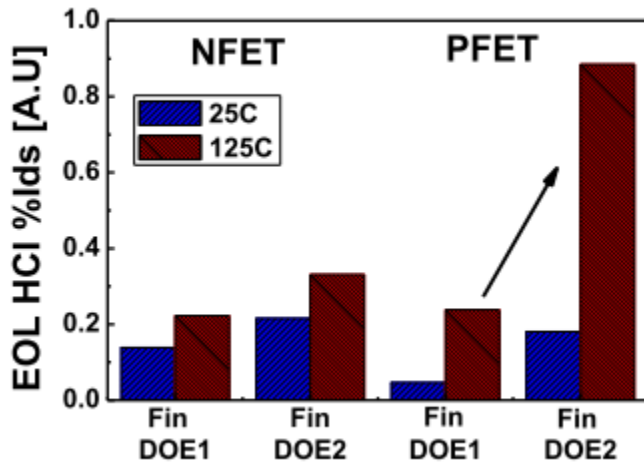


Fig. A. On FinFET devices, PFET HCI under high temperature is worse than NFET HCI.

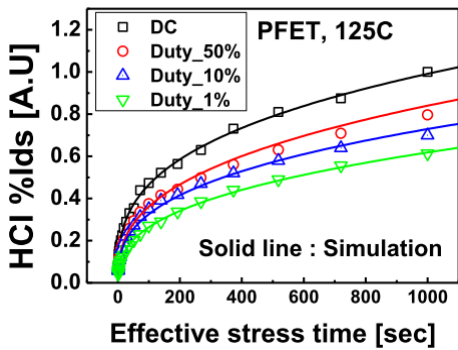


Fig. B. PFET HCI degradation is reduced when low duty HCI pulses are applied. This suggests DC HCI stress increases the junction temperature due to self-heating effect (SHE) and ends up more HCI degradation.

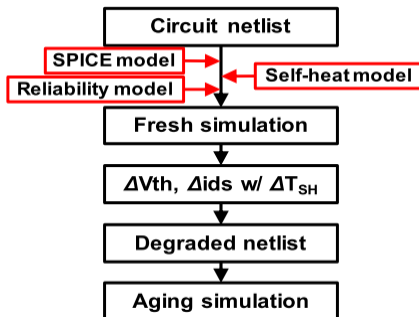


Fig. C. Self-heating model is embedded into SPICE simulation with aging runs for accurate circuit qualification.