Impact of Oxygen-enriched SiN Interface on Al_2O_3 Gate Stack An Innovative Solution to Low-power CMOS

S. Saito, Y. Shimamoto, S. Tsujikawa, H. Hamamura, O. Tonomura, D. Hisamoto, T. Mine, K. Torii, J. Yugami, M. Hiratani, T. Onai, and S. Kimura

Hitachi Ltd., Central Research Laboratory
Kokubunji, Tokyo, 185-8601, Japan
Tel: +81-42-323-1111, Fax: +81-42-327-7773,
E-mail: ssaito@crl.hitachi.co.jp

A SiN dielectric with oxygen-enriched interface (OI-SiN) was applied as an interfacial layer of an Al_2O_3 stack. The OI-SiN interface, where the nitrogen profile is controlled and the fixed charge is suppressed, can solve critical issues for high-κ dielectrics; impurity penetration through conventional processes, and reduced mobility due to Coulomb scattering. Thus, the drivability with low-leakage current is ensured. We show a scaling strategy to integrate the OI-SiN/Al_2O_3 stack which is suitable for low-power applications.