

Metal Gate MOSFETs with HfO₂ Gate Dielectric

S. B. Samavedam, H. H. Tseng, P. J. Tobin, J. Mogab, S. Dakshina-Murthy*, L. B. La, J. Smith, J. Schaeffer, M. Zavala, R. Martin, B.-Y. Nguyen, L. Hebert, O. Adetutu, V. Dhandapani, T-Y.Luo, R. Garcia, P. Abramowitz, M. Moosa, D. C. Gilmer, C. Hobbs, W. J. Taylor, J. M. Grant, R. Hegde, S. Bagchi, E. Luckowski, V. Arunachalam and M. Azrak.

Digital DNA Laboratories, 3501 Ed Bluestein Blvd., MD:K10, (*AMD)
Austin, TX 78721, USA. (Tel: 512-933-7180, FAX: 512-933-8787,
sri.samavedam@motorola.com)

We report for the first time electrical characterization of HfO₂ p- and n-MOSFETs with CVD TiN and PVD TaSiN gates respectively. Their performance is compared to PVD TiN-gated HfO₂ and SiO₂ n- and p-MOSFETs. To understand the issues with metal gates on high K gate dielectrics, PVD TiN MOSFETs were extensively characterized. At 10nA/μm leakage, 0.375mA/μm drive current was obtained from PVD TiN/HfO₂ p-MOSFETs. HfO₂ n-MOSFETs with metal gates show about 10⁴ times reduction in gate leakage compared to poly/SiO₂ devices.