

Abstract

Improved Thermal Stability and Device Performance of Ultra-thin ($EOT < 10\text{\AA}$) Gate Dielectric MOSFETs by using Hafnium Oxynitride (HfO_xN_y)

Chang Seok Kang, H.-J. Cho, K. Onishi, R. Choi, R. Nieh, S. Goplan, S. Krishnan, and Jack C. Lee
Microelectronics Research Center, University of Texas at Austin, 10100 Burnet road,
Austin, TX 78758, U.S.A

Hafnium oxynitride (HfO_xN_y) film was prepared and characterized for gate dielectrics application with $EOT < 10\text{\AA}$ for the first time. Thermal stability and crystallization during the subsequent thermal process were improved significantly by using HfO_xN_y over HfO_2 . The superior thermal stability of HfO_xN_y can be attributed to the strengthened immunity to oxygen diffusion by the incorporated nitrogen. Furthermore, excellent transistor characteristics were obtained for both p and nMOSFETs.