Tutorial 5: Ferroelectric Memories and Beyond

Johannes Műller, Globalfoundries

Recent advances in scaling and CMOS-compatible implementation of ferroelectric thin films has sparked renewed interest to utilize the unique properties of these materials in advanced CMOS technology nodes. Led by the ferroelectric memory development and further fueled by new applications fields such as steep slope devices and neuromorphic applications, this field has seen a strong growth in R&D activity over the last decade. This tutorial will give an introduction to ferroelectric materials and devices with special emphasis on the utilization of hafnium oxide based thin films. The working principle as well as the challenges of capacitors based ferroelectric random access memory (FRAM), ferroelectric field effect transistor (FeFET) and ferroelectric tunnel junction (FTJ) will be reviewed. In addition, a brief outlook on beyond memory applications of CMOS-compatible ferroelectric thin films will be given.