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Ferroelectric Thin films for Non-volatile Memories

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Recently, ferroelectric thin films have been explored extensively for the applications to memory devices due to their inherent characteristics such as remanent polarization and high dielectric constant. Current status of research and development of ferroelectric thin films for memory applications will be briefly reviewed. Ferroelectric thin films and metal oxide heterostructures have been grown by pulsed laser deposition (PLD) to prepare capacitors which are incorporated into the CMOS structure. These ferroelectric thin film capacitors have metal-oxide electrode, (La,Sr)CoO₃ (LSCO) and lead zirconate titanate (PZT and PLZT). Reliabilities of the ferroelectric capacitors for non-volatile memory applications such as fatigue, aging, retention and imprint were studied with an emphasis on the imprint. Process parameters for ferroelectric capacitor fabrication were also investigated. Furthermore, ferroelectric capacitors have been scaled down to a dimension (2 μ m diameter) that are commensurate with the requirement of high density non-volatile memory technology.