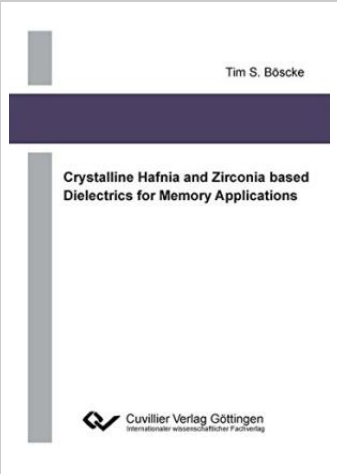

Crystalline Hafnia and Zirconia based Dielectrics for Memory Applications

By Tim S. Böscke

Cuvillier Verlag Mai 2010, 2010. Taschenbuch. Condition: Neu. Neuware - This work investigates the crystallography and dielectric properties of Zirconium- and Hafnium-oxide based nano-scale thin film insulators for memory.Hafnium- and Zirconium-oxide are industry leading candidates for high-k dielectrics. Most application research has focused on the application of amorphous high-k due to formation of defects associated with the crystalline phase. However the application of crystalline dielectrics offers two advantages: Potentially high thermal stability, since no measures have to be taken to avoid crystallization, and the ability to manipulate crystalline phase composition to maximize dielectric constants.Pure ZrO2 crystallized at a lower temperature than HfO2 and always formed a metastable t' higher-k phase. ZrO2 crystallized already during deposition, leading to leakage current degradation. It was shown that this problem could be solved by SiO2 addition to raise the crystallization temperature, allowing fabrication of low leakage, low effective oxide thickness (EOT) metal-insulator-metal (MIM) capacitors suitable for stack based DRAM down to the 4X nm node.HfO2, in contrast, formed a mixture of monoclinic and tetragonal phase which led to the formation of mechanical defects (microcracks). Addition of SiO2 allowed manipulating the phase composition of HfO2. When up to 7 mol% SiO2 was added, increased stabilization...

Reviews

Extensive guideline! Its this sort of very good go through. I have got read and i am confident that i will gonna read through once more once more in the future. Once you begin to read the book, it is extremely difficult to leave it before concluding.

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