EFFECT OF STRUCTURAL IMPERFECTIONS ON THE CHARACTERISTICS OF YSZ DIELECTRIC LAYERS GROWN BY E-BEAM EVAPORATION FROM THE CRYSALLINE TARGETS

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The films under study were deposited by e-beam evaporation of yttria-stabilized zirconia (YSZ) crystalline samples on the n-doped Si (111) substrate at 750 °C. The XRD patterns of the films revealed their polycrystalline structure with a mixture of different phases, mainly the face-centered cubic one. The electrical conductivity and the activation energy as the functions of the yttria content indicated the influence of isolated oxygen ion vacancies as well as the associated point defects. The relative permittivities (εR = 17 – 26) measured at room temperature and 1MHz confirmed YSZ as a high-k gate dielectric also in the form of thin film. The measured microhardness data, evaluated according to Jonsson-Hogmark composite hardness model, (H = 5.9 – 10.8 GPa), as well as a high refractive index (n = 1.96 – 2.20) render from YSZ a promising material for protective coatings and optical applications, respectively.

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