Nanoscale Physics

Influence of the interface states in MOS structures:

Analysis of Capacitances-Voltage characteristics

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This work consists in a study of the influence of interface states (D_{it}) situated at the interface: Oxide/Substrate, in a MOS (Metal – Oxide – Semiconductor) capacity with metal gate, (SiO_2) nanometric dielectric and (P) type Silicon substrate. The physical properties of the (SiO_2) and that of the interface (Si/SiO_2) condition the reliability of the structure; the study of their microscopic properties has then a particular interest.

For this, we will analyze the Capacitance-Voltage characteristics C(V) of our structure, obtained by resolving both "POISSON" and "SCHRODINGER" equations at one dimension. We will particularly study, the impact of the (D_{it}) concentration, the type of the charge which they introduce and also, the effect of the substrate's doping on their activation.

The principal results show clearly that interface states affect the C(V) curves at the depletion regime. They also affect both the threshold voltage and flat band voltage with respect of their type. We conclude through one of our simulations that high substrate's doping can be a good remedy for these states.

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2. *Md.M. Satter[a,1], A. EhteshamulIslam[b],D.Varghese[b], M. Alam[b],A. Haque[c], «A self-consistent algorithm to extract interface trap states of MOS devices onalternative high-mobility substrates» .Solid-State Electronics 56(2011) 141_147.*