

Nanoparticle formation in Zn⁺ and O⁺ ion sequentially implanted SiO₂ film

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The ⁶⁴Zn⁺ and ¹⁶O⁺ ions were implanted in SiO₂ film on Si substrate with next parameters: the implant dose was $5.0 \cdot 10^{16} \text{ cm}^{-2}$, for Zn⁺ ions the energy was 50 keV and for O⁺ ions the energy was 16 keV. Then the samples were subjected to isochronally annealing during 1 h in N₂ atmosphere (400–600°C) and in Ar atmosphere in temperature range from 700 up to 1000°C with a step of 100°C. After annealing the samples surface is structured and its roughness increases due to nanoparticle formation in subsurface layer. In as implanted and in annealed samples on its surface and in its body the Zn-contained nanoparticles with a size about 100 nm were formed. These nanoparticles consist presumably from Zn phase after implantation and from ZnO phase after annealing at 700°C.