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The improvement of Pt adhesion to silicon wafer using ultra thin Ti metal interlayer modified by N_2 Ion beam irradiation

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The ultra thin Ti metal layer with 100Å thickness was deposited on silicon wafer (100) by ion beam sputtering by 1keV Ar ion beam. In order to improve the adhesion between Pt metal and Si substrate, the deposition of Ti interlayer on Si was irradiated by nitrogen ion beam with the variations of ion beam energy of 0.5 ~ 1.2 keV and ion dose from 1×10^{15} to $1\times10^{17}/cm^2$. As a result of the scotch tape test, the sample modified at the ion dose of N_2 1×10^{16}/cm2 showed good adhesion properties. The improved adhesion between Pt/TiN/Ti/Si were investigated by X-ray photoelectron spectroscopy(XPS) and scanning electron microscopy(SEM). Then Pt metal was deposited on TiN/Ti ultra-thin film by ion beam sputtering method. The studies which are performed are on a laboratory scale as well as field tests for improved adhesion of protective coatings. In addition, the thermal stability and interface properties were annealed from 300 to 600 ℃ in conventional furnace. From this result, TiN/Ti layer was good thermal stability between Pt and Si substrate so the TiN layer was available to be used as the sacrificial diffusion barrier for Platinum.