

The irradiation-induced silicide formation in ion beam-mixed layer of Au/Si(1 0 0) system was investigated by using 200 keV Kr⁺ and 350 keV Xe⁺ ions to fluences ranging from 8×10¹⁴ to 1×10¹⁶ ions/cm² at room temperature. The thickness of Au layer evaporated on Si substrate was ~500 Å. Rutherford backscattering spectrometry (RBS) experiments were carried out to study the irradiation effects on the mixed layers. We observed that at the fluence of 1×10¹⁶ Kr⁺/cm² and starting from the fluence of 8×10¹⁴ Xe⁺/cm², a total mixing of the deposited Au layer with Si was obtained. RBS data corresponding to the fluences of 1×10¹⁶ Kr⁺/cm² and 8×10¹⁴ Xe⁺/cm² clearly showed mixed layers with homogenous concentrations of Au and Si atoms which can be attributed to gold silicides. The samples irradiated to fluences of 1×10¹⁶ Kr⁺/cm² and 1×10¹⁶ Xe⁺/cm² were also analyzed by X-ray photoelectron spectroscopy (XPS). The observed chemical shift of Au 4f and Si 2p lines confirmed the formation of gold silicides at the surface of the mixed layers. Au₂Si phase is obtained with Kr⁺ irradiation whereas the formed phase with Xe⁺ ions is more enriched in Si atoms. © 2006 Elsevier Ltd. All rights reserved