

The mixing of Au in Si induced by secondary and high-order recoil implantation was investigated using 350 keV Ar⁺ and 350 keV Kr⁺ ions to fluences from 1×10^{16} to 3×10^{16} ions/cm² at room temperature. The thickness of the Au layer evaporated on Si substrate was ~ 2400 Å. The ranges of the Ar and Kr ions were chosen to be lower than the thickness of the Au layer in order to avoid the ballistic mixing produced by the primary knock-on atoms. Rutherford backscattering spectrometry (RBS) experiments were carried out to study the effects induced by Ar and Kr irradiation at the interface of Au-Si system. We observed that in the case of the irradiation with Ar⁺ ions, a broadening of the Au-Si interface occurred only at the fluence of 3×10^{16} Ar⁺/cm² and it is attributed to the surface roughening induced by ion bombardment. In contrast, the RBS analysis of a sample irradiated with 2×10^{16} Kr⁺/cm² clearly showed, in addition to the broadening effect, the formation of a mixed zone of Au and Si atoms at the interface. The mixing of Au in Si atoms can be explained by the secondary and high-order recoil implantation followed by subsequent collision cascades.