

[SP-01]

Analysis of light elements by ERD-TOF using 10 MeV Fluorine

J.K. Kim, W. Hong, G.D. Kim, H.J. Woo, H.W. Choi and C.H. Eum
Korea Institute of Geoscience and Mineral Resources(KIGAM)

An elastic recoil detection by time of flight(ERD-TOF) system has been performed using 10 MeV ^{35}Cl ion as the probe in typical case of KIGAM. ^{35}Cl ions have many advantages in our case such like large sensitivity, good depth resolution, and fine mass resolution. However, the accessible depth of ^{35}Cl ion is limited to 3000Å since our accelerator has the small terminal voltage of 1.7 MV at the maximum. And the small accessible depth always causes a serious problem to analyze samples having thick film.

To prolong the accessible depth, fluorine ions were used for light element analysis in this work. Simulation for 10 MeV ^{35}Cl ions and ^{19}F ions resulted in the ranges of 4.8 μm for ^{35}Cl and of 6.5 μm for ^{19}F in Si wafer. Another calculation showed that the maximum accessible depth of these two species in SiO_2 film were 3000Å for ^{35}Cl and 5500Å for ^{19}F . Recoil cross sections of ^{19}F is reduced to 10 % for H atom and 16 % for Si atom with respect to it of ^{35}Cl . A LiNiVO_4 film (1000Å) on silicon wafer was measured by both of F-ERD and Cl-ERD. The accessible depth was improved almost twice by just altering the probe ion from ^{35}Cl to F.