

RIKEN TANDETRON

H.Sakairi, E.Yagi, T.Kobayashi and T.Urai
The Institute of Physical and Chemical Research

Tandetron is a tandem type ion accelerator, a commercial product of General Ionex Corporation in U.S.A. The RIKEN Tandetron is equipped with two ion sources, a duoplasmatron and a sputter source. The former has been used mainly for helium ion production. Positive ions from duoplasmatron are changed to negative ions by passing through a lithium vapour canal. In the latter source, cesium ions are used as primary ions for sputtering to produce the negative ions from a solid target.

High voltage for acceleration is generated by a Cockcroft-Walton type circuit. It can be varied between 0.35MV and 1MV. The accelerated negative ions are changed to positive ions at the coupler of the tandem, which is a nitrogen gas canal. The ion beam is focused, after final acceleration by a doublet of electrostatic quadrupole and inflected by $+15^\circ$ or $+30^\circ$ with an analyzing magnet, the ME value of which is 136 for the 15° port. Ions of He, B, C, Si and Au were already accelerated in our laboratory. The beam intensity obtained were listed in the table 1.

Main experimental facilities are a Rutherford back scattering spectrometer and an ion induced X-ray spectrometer. In the scattering chamber for RBS, a three axis goniometer was installed to make the channeling RBS measurement possible.

Current subjects of research are depth profiling of implanted ions in solid materials by RBS spectrometry, identification of lattice location of implanted ions in crystalline solids by channeling RBS spectrometry, ion induced X-ray spectroscopy on chemical effects of outer shell electrons in chemical compounds, and depth profiling of hydrogen in solid materials by resonance reaction of Boron.

Table 1 Operating condition and beam intensity.

Ion	Negative Ion Beam Intensity (μA)	Acceleration Energy (MeV)	Beam Intensity (μA)
He ⁺	0.8	1.0	1
He ²⁺	0.8	1.5	0.1
B ²⁺	1.0	2.2	0.34
C ⁺	7	1.4	0.6
C ³⁺	10	2.8	0.9
Si ²⁺	9	2.4	2
Si ³⁺	9	3.2	0.8
Si ⁴⁺	9	4.0	0.25
Au ³⁺	5	1.4	0.22
Au ⁴⁺	5	2.5	0.18