

Development of C₆₀ Cluster Ion Gun with Rotating Field Mass Filter

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For the high resolution 3D (lateral and in-depth) surface analysis combined with ion sputter etching, the use of the C₆₀ cluster ion beam is one of promising approach, because it has the potential to realize both the high lateral resolution and the high depth resolution simultaneously, and also high secondary ion yield [1, 2]. In the present study, we developed the compact C₆₀ cluster ion gun with rotating field mass filter, which can be attached to the conventional surface analytical instruments.

The rotating field mass filter developed here is based on the phase-stability mass spectrometer originally proposed by Kramer and Le Poole, which consists of two x-y deflectors providing rotating electric fields, an electrostatic lens and two apertures [3]. Although this is a principally TOF spectrometer, this can provide the continuous ion beam. and has following merits;

- (1) The construction is so simple that we can arrange the ion source, mass filter optics and sample on a line.
- (2) Neutral particles can be eliminated in spite of the linear arrangement of the system.
- (3) The higher mass cluster ions can be selected more easily as a pulsed TOF system.
- (4) Efficiency in use of C₆₀ material is better than a pulsed TOF system.

In the present study, we investigate the optimum operating condition of the ion source, and the performance of the rotating field mass filter.

References

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