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Production of Multicharged Metal Ion Beams on the First Stage of Tandem-Type ECRIS

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Multicharged metal ion beams are expected to be applied in wide range of fields. We have constructed tandem-type ECRIS which consists of two individual ion sources.¹ We aim at synthesizing endohedral metallofullerenes by transporting metal ion beam from the first stage into the fullerene plasma in the second stage. Since dissociated fragments and impurities disturb synthesis of new material in gas-phase, high purity metal vapor source is required. We have already developed induction heating (IH) evaporator for solid state metal.^{2,3} The structure is complicated, and then vapor flux is rather than small. Therefore, we developed new radiation heating evaporator and directly ohmic heating evaporator which can generate large vapor flux. This radiation heating evaporator is heated by thermal radiation of a tungsten wire. Tungsten wire is surrounded by molybdenum plate, and heating metal is attached to the molybdenum plate.

The aim of this paper is to investigate properties of new two evaporators and produce metal ion beam on the first stage of tandem-type ECRIS. In the experiment, we used solid state iron. As a result, it is successful to extract Fe⁺ ion beam from the first stage and introduce Fe⁺ ion beam to the second stage. In near future, we are planning synthesis experiment of Fe and C₆₀.

References

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2. Y. Kato, et al, RSI, **77**, 03A335 (2006)
3. O. Kutsumi, et al, RSI, **81**, 02A322 (2010)