Development Status of the Ion Source in J-PARC Linac Test Stand

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For the upgrade plan of the Japan Proton Accelerator Research Complex (J-PARC) linac peak current to realize 1 MW beam power from the 3 GeV rapid cycling synchrotron (RCS), a new front-end system, which is composed of a cesiated rf-driven H^- ion source and a new Radio Frequency Quadrupole linac (RFQ) for the peak current of 50 mA as shown in Fig. 1, is being tested in J-PARC linac test stand. The rf-driven H^- ion source was developed to satisfy the J-PARC upgrade requirements of an H^- ion beam current of 60 mA and a lifetime of more than 50 days [1].

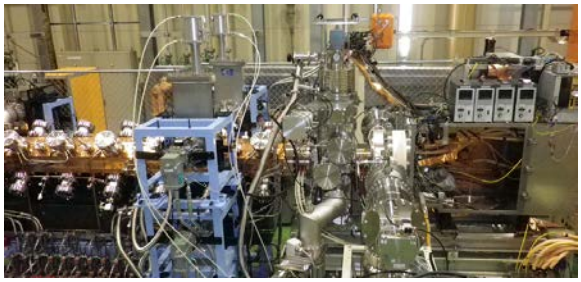

Fig. 1 Photograph of the new front-end system, which is composed of a cesiated rf-driven H^- ion source (right side) and a new RFQ (left side).

On February 6, 2014, the first 50 mA H^- beam was successfully accelerated by the RFQ. The prototype rf-driven H^- ion source with a nickel plated oxygen-free-copper (OFC) plasma chamber was used for the initial test. Then the production type source with a plasma chamber of stainless steel (SS) to improve maintainability and trim weight is being tested. In order to demonstrate the performances of the rf-driven ion source before the installation at 2014 summer, a test of long-term stability through continuous beam operation, including lifetime estimation of the rf-antenna, and evaluation of cesium consumption, will be planned.

This paper reports about development status of the ion source in J-PARC linac test stand.

References

[1] A. Ueno et. al., Rev. Sci. Instrum. **85**, 02B133 (2014).