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Development of a New J-PARC-Made Internal Antenna for the J-PARC RF-Driven H^- Ion Source

We have been conducting the test of a new home-made internal antenna for the J-PARC RF-driven cesiated H^- ion source. After the development of the first J-PARC-made antenna, the composition of the porcelain enamel coating of the antenna was changed to reduce possible outgassing of the impurities from the previous antenna coating. During the test of high-density plasma production by the new antenna, we monitored the outgassing characteristics of the new antenna by measuring the mass spectrum of the source gas and optical emission spectrum of the plasma. It is confirmed that no remarkable impurities were detected from the new antenna. We also carried out the H^- beam extraction and measured the H^- beam characteristics by using the new antenna. The observed emittances of the H^- beam extracted from the J-PARC RF-driven cesiated H^- ion source by using the new antenna were similar to those by using the SNS-made antenna. To accelerate the endurance test of the new antenna, we applied the antenna for the high-density plasma production to the 5% duty factor (1 ms pulse width with 50 Hz repetition rate) with the 2 MHz RF input power of approximately 60 kW. These values are much higher than those in the J-PARC nominal operation; 0.8 ms pulse width with 25 Hz repetition rate (the duty factor of 2%) with the RF input power of approximately 30 kW. This presentation shows the results of the characteristics of the new J-PARC-made antenna and discusses the feasibility of the new antenna for use in the J-PARC accelerator operation.

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Yes

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