

Single Element of the Matrix Source of Negative Hydrogen Ions: Measurements of the Extracted Currents Combined with Diagnostics

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Combining experiments on the negative ion extraction with discharge diagnostics (probe and laser photodetachment diagnostics), the study is an extension of recent experiments [1-3] in a single discharge of the matrix source [4]. The single element of the source is a small (2.25 cm) radius hydrogen discharge ending at the first electrode of the extraction device (a three electrode system completed by a plasma electrode, an extraction/electron suppression electrode, with permanent magnets embedded in it, and a Faraday cup for measuring the extracted negative-ion current). The discharge is inductively driven by a planar coil positioned on its front wall. The axially movable Langmuir probe used in the probe diagnostics provides results for the axial variation of the electron density and temperature and of the plasma potential. In the laser photodetachment measurements a radially oriented laser beam (from a Surelite III-10 Nd:YAG laser operating at its second harmonics) combined with the probe provides results for the electronegativity and the negative ion density in the vicinity of the extraction device. In the measurements on the extraction, the extracted currents of negative ions and electrons are measured for different voltages applied to the electrodes of the extraction device. The conclusions are for the correlation between the plasma parameters and the extracted current densities.

References

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