Measurement of hydrogen negative ions in sheet plasma

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Negative ions are expected to play an essential role in particle accelerators, magnetic fusion reactor, and plasma processing. The production mechanisms of negative ions in hydrogen plasma are not easily understood because of the complex phenomena of atomic and molecular reactions. However, measurement method of negative ions using mass analyzer has not been established.

We have carried out the experimental observation of negative ions in hydrogen sheet plasma \cite{1}. The sheet plasma is suitable for the production of negative ions, because the electron temperature in the central region of the plasma as high as 10 – 15eV, whereas in the periphery of the plasma, a low temperature of a few eV of obtained. The negative and positive ions density (H\textsuperscript{−}, H\textsuperscript{+}, H\textsubscript{2}\textsuperscript{+}, H\textsubscript{3}\textsuperscript{+}) were detected using an “omegatron” mass analyzer, while the electron density and temperature were measured using a Langmuir probe.