

# Divergence angle control of an ion beam extracted from an rf plasma source

High intensity and collimated beam  
Large diameter diverging beam

## Overview

In an apparatus for generating a plasma by a high frequency discharge and extracting an ion beam, a high frequency electric field leaks to a beam extraction interface being distant from the plasma generator; the oscillation of the interface leads to a divergence of the beam. The beam divergence has been a serious problem in thermonuclear fusion plasma reactors, since a part of high intensity beam cannot reach the core of the magnetically confined plasma.

The present invention is an ion beam generator that uses a certain technique to compensate the oscillation of the beam extraction interface and provide a collimated high intensity ion beam extracted from an rf plasma source. Conversely, it is also possible to expand the divergence angle by superimposing the oscillation of the beam extraction interface to form a large diameter ion beam for material processing.

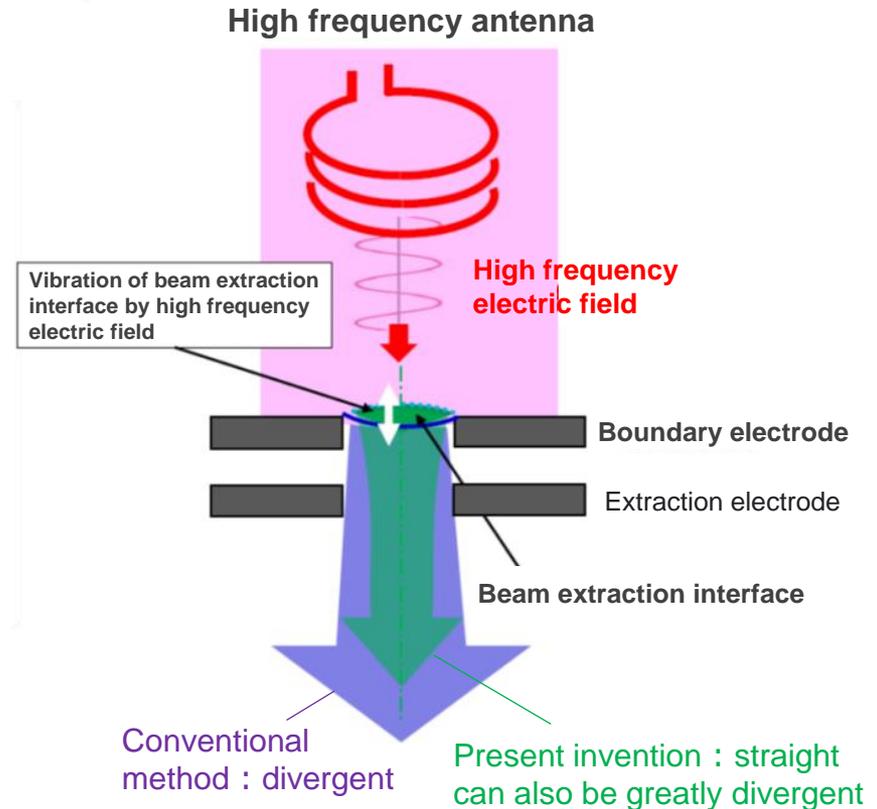
## Product Application

- ❑ High-intensity and low loss beam with small divergence angle  
→ nuclear fusion, accelerators, focused ion beams (FIB)
- ❑ Uniform beam with large divergence angle  
→ semiconductor manufacturing, etching, film formation
- ❑ Control of thrust and propulsion direction of spacecraft

## IP Data

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## Divergence angle of ion beam can be controlled



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