

Abstract Submitted
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Formation of ion-ion plasmas and ion beams in continuously rf generated plasmas ANE AANESLAND, LARA POPELIER, PASCAL CHABERT, LPP, Ecole Polytechnique — Ion-ion plasmas can offer useful advantages in a variety of applications where neutral or quasi-neutral beams are used, some examples are charge-free etching, neutral beam injections for fusion or for electric propulsion. For many electronegative gases the cross sections are such that ionizing collisions (creating positive ions) are dominating at high electron temperatures while electron attachment dominates at low T_e (creating negative ions). Hence, ion-ion plasmas are therefore generally formed in the afterglow of electronegative plasmas or in the periphery of magnetized electronegative plasmas; in both cases the ion-ion plasma is formed where or when the electron temperature drops and efficient electron attachment can occur. The ion density in the ion-ion plasma region drops generally by a factor of ten or more, compared to the regions where electrons are present. This density decrease is catastrophic for the efficiency of any application using ion-ion plasmas. We demonstrate here that by tailoring T_e and by injecting the electronegative gas in both a high and a low T_e region can efficiently produce ion-ion plasmas. Grid-less extraction and acceleration of ions from an ion-ion plasma, by biasing the bulk plasma to large positive or negative voltages, is being investigated. Results from this experimental investigation will be reported here.

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