Plasma propulsion with electronegative gases

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A new concept of plasma propulsion is proposed, where the thrust is provided by both positive and negative ions resulting in a globally neutral beam downstream in space. The basic idea is to create an ion-ion plasma (electron free region) at the periphery of a highly ionized plasma core such that positive and negative ions can be extracted either simultaneously or alternately by dc biased extractor grids. As the extracted beam is globally neutral there is no need for a neutralizer downstream. The recombination of positive and negative ions is very efficient and will result in a fast recombination downstream of the thruster and hence the common problems of downstream plasma behind the thrusters are suppressed.