

Abstract Submitted  
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**Production of negative ion plasmas using perfluoromethylcyclohexane ( $C_7F_{14}$ )**.<sup>1</sup> SU-HYUN KIM, ROBERT MERLINO, VLADIMIR NOSENKO, ROSS FISHER, MICHAEL MILLER, University of Iowa — Negative ion plasmas are produced by electron attachment to neutral molecules when an electronegative gas is introduced into a plasma. One of the most widely used gases is sulfur hexafluoride,  $SF_6$  which has a relatively high electron attachment cross section for low energy ( $<0.05$  eV) electrons, making it particularly attractive for use in Q machines, where  $T_e \sim 0.2$  eV. However, in discharge plasmas having  $T_e \sim$  several eV, multiple negative ion species are also formed, including  $F^-$ , which can be corrosive to vacuum system components. As an alternative, we have investigated the use of  $C_7F_{14}$  to produce negative ion plasmas, both in a Q machine and in a hot-filament, multidipole device. The maximum attachment cross-section is  $\sim 6$  times higher than that of  $SF_6$ , and occurs at a higher energy, 0.15 eV, so that the attachment efficiency should be enhanced both in the Q machine and in the discharge plasma. Details of the experimental setup and Langmuir probe characteristics obtained in the plasma with  $C_7F_{14}$  will be presented.

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