

Abstract Submitted  
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**Evaluation of iodine as an alternative propellant for gridded electric space propulsion systems**<sup>1</sup> PASCALINE GRONDEIN, TREVOR LAFLEUR, PASCAL CHABERT, ANE AANESLAND, Laboratoire de Physique des Plasmas - CNRS - UPMC — Most state-of-the-art electric space propulsion systems such as gridded and Hall thrusters use xenon as the propellant gas. However, xenon is very rare, expensive to produce and used in a number of competing industrial applications. Alternatives to xenon are currently being investigated, and iodine has emerged as a potential candidate. Its lower cost, larger availability, its solid state at standard temperature and pressure, its low vapour pressure and its low ionization potential makes it an attractive option. In this work we compare the performances of a gridded ion thruster operating in iodine and in xenon under otherwise similar conditions using a global model. The thruster parameters such as neutral, ion and electron densities and electron temperature were calculated as well as the system performances such as thrust, specific impulse, etc. When running with a neutral gas flow of 1 mg/s, an acceleration potential of 1000 V and RF power of 800 W, the model predicts a thrust of 30 mN for an extraction diameter of 60 mm for both iodine and xenon. The thruster efficiency is however 15% higher for iodine compared to xenon mainly due to the lower ionization energy for iodine and larger ion mass due to the contribution from I<sub>2</sub> ions.

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