



**Online LTP Seminar
November 16, 2021
9 am EST**

Investigation of iodine plasmas for space propulsion applications

Prof. Pascal Chabert

Ecole Polytechnique, Palaiseau, France

Plasma Thrusters are now routinely used in satellites, both for station keeping and orbit transfer. They are also essential for deep space exploration where very large velocity increase (Δv) are required. So far, the main propellant gas used in plasma thrusters is xenon, which is both heavy and easy to ionize. However, xenon is expensive and is hardly available in large quantities. Therefore, it is important to explore other propellant gases for the future of plasma propulsion. At LPP, we investigate iodine as an alternative to xenon. Iodine is in solid state in standard conditions, but sublimates easily. It is heavy, and the ionization potential is even lower than xenon. However, it is a molecular gas (the feedstock gas is I_2) and the energy cost for an electron-ion pair created is higher than for a noble gas. Finally, it is an electronegative gas, which can generate negative ions. The plasma physics and chemistry involved is therefore rather complex. The talk will present the research effort currently carried out at LPP to better understand iodine plasmas.



Short Bio

Dr. Pascal Chabert obtained his PhD in Orsay University in 1999. After his PhD, he worked at UC Berkeley (USA) as a Visiting Postdoctoral Researcher in the group of prof. Michael A. Lieberman. In 2000 he entered the CNRS to work at the Ecole Polytechnique (Palaiseau, France) as a permanent researcher in the plasma physics laboratory (LPP). He is now Research Director within CNRS, Professor at Ecole polytechnique, and he has been the director of LPP from 01/2015 to 12/2019. His main research field is plasma physics and plasma processing. In the first part of his career, the main area of application of his research has been plasma etching for microelectronics. More recently, he has also started activities in plasma propulsion for space application.

- In 2007, he received the IUPAP Young Scientist Prize in Plasma Physics.
- In 2010, he organized in Paris (France) the 63rd Gaseous Electronics Conference (GEC), joined with the 7th International Conference on Reactive Plasmas (ICRP).
- In 2011, he co-authored a text book on the Physics of Radiofrequency Plasmas with Nick Braithwaite (Cambridge University Press).
- In 2014, he received the William Crookes Prize delivered by the European Physical Society and Plasma Sources Science and Technology (PSST).
- In 2019, he gave the Gaseous Electronics Conference Foundation TalkCO2 conversion.

