FLTPD XI
24-28 May 2015
Porquerolles island, France

The 11th Frontiers in Low Temperature Plasma Diagnostics is organised by

The PIIM laboratory (Aix-Marseille University and the CNRS)

International scientific committee :

- Nader Sadeghi, Grenoble (F) - chair
- Georgio Dilecce, Bari (I)
- Uwe Czarnetzki, Bochum (D)
- Richard Engeln, Eindhoven (NL)
- Nick Braithwaite, Milton Keynes (UK)
- Frantisek Krcma, Brno (CZ)

Local organising committee :

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- Lénaïc Couëdel, CNRS-AMU- co-chair
- Alexandre Escarguel, AMU-CNRS
- Kostiantyn Achkasov, CEA Cadarache-AMU
- Xin Yang, AMU-CNRS
- Pierre David, AMU-CNRS
- Nathalie Bonifay, AMU-CNRS
- Marie-Pierre Carvin, AMU-CNRS
- Régis Khamchanh, AMU-CNRS

PROGRAM

Presentations

The time slots for the invited lectures are 45 minutes long, 35 minutes for the talk and 10 minutes for questions. Topical lectures should be planned with 20 minutes for the talk and 5 minutes for questions. Please allow time for discussion.

Poster sessions

The poster sessions are planned after the dinner on Monday and Tuesday. Please make sure that your poster is put on the board well before the beginning of the poster session. Please use the board with the corresponding number to hang your poster. During the poster sessions drinks will be available.

Industrial exhibition

The following exhibitors will be present:
• Sairem http://www.sairem.com
• Solayl http://www.solayl.com/
• Journal of Physics D: Applied Physics http://iopscience.iop.org/0022-3727
Lunch breaks and the discussion time on Monday and Tuesday are ideal moments to visit the exhibition booths.

The excursion

The excursion is planned for Wednesday May 27th right after lunch.
In the early afternoon, different options are proposed:

- A guided tour of the village and the surroundings (two groups).
- A kayak excursion (one group, number of participants).

In the late afternoon, a wine testing is organised in a local winery (Domaine Perzinsky). Two time slots, ~40 people each are proposed:

- 17:00-18:00
- 18:00-19:00

We kindly request you to register for the desired activities on arrival.

Conference dinner

The conference dinner will be held on Wednesday after the excursion in the conference centre. A prize will be awarded for the best student presentation during the dinner.

15. *Light emission from diffuse coplanar barrier discharge in neon induced by charge relaxation*
Zdenek Navratil, Department of Physical Electronics, Masaryk University

16. *Manipulation of helium barrier discharges by laser surface interaction*
Sebastian Nemschokmichal, Institute of Physics, University of Greifswald

17. *Measurement of Metastable Helium Density in Radio Frequency Dielectric Barrier Discharge in Helium at Atmospheric Pressure*
Jean-Sébastien Boisvert, Université de Montréal, Laboratoire Procédés, Matériaux et Energie Solaire

18. *Optical and probe diagnostics of a 2.45 GHz ECR coaxial plasma source*
Juslan LO, Equipe de Recherche Diagnostic des Plasmas Hors Equilibre - Louis Latrasse, SAIREM

19. *Recombination of ortho and para H3+ ions with electrons at low temperatures using flowing afterglow technique*
Petr Dohnal, Department of Surface and Plasma Science, Faculty of Mathematics and Physics, Charles University in Prague

20. *Simulating an Ion Energy Analyzer using Particle-in-Cell technique*
Jernej Kovacic, Jozef Stefan Institute

21. *Spectroscopic investigation of carbon and tungsten dust in magnetized and non-magnetized hydrogen plasma*
Karim Ouaras, LSPM

22. *Temporal evolution of plasma density in a pulsed 2-frequency (2/13.56MHz) 2-antenna inductively coupled plasma discharge*
Nishant Sirse, Dublin City University

23. *The Research of well-known Explosive RDX by Thermal Decomposition Technique by the means of Ion Mobility and Mass spectrometry*
Zuzana Lichvanova, Comenius University in Bratislava

24. *The temperature of electrons of complex plasma in the mixture of He/Ar in radio frequency discharge*
Yerbolat Ussenov, IETP, al-Farabi Kazakh National University

25. *Time development of electric field in gamma-mode RF APGD in helium*
Zdenek Navratil, Department of Physical Electronics, Masaryk University

26. *Visible spectrum tomography of rotating coherent modes in a linear magnetized plasma*
Pierre David, Physique des interactions ioniques et moléculaires

The temperature of electrons of complex plasma in the mixture of He/Ar in radio frequency discharge

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1. Introduction

Dusty (complex) plasma is the usual low-temperature plasma which contains small solid particles, with sizes from tens of nanometers to several hundreds of micrometers [1,2]. Dust particles in the plasma acquire charge equals to few tens of thousands of elementary charges and can be ordered create plasma dust structures. Diagnostics of low-temperature dusty plasmas using traditional methods is of great interest and the results show that the presence of dust particles significantly affect the basic properties of the background plasma. As well, the addition of the impurity gas in the main gas leads to significant changes in the structural and dynamic properties of plasma-dust formations [3,4]. This work presents the results of measurements of the electron temperature of the complex plasma in a mixture of noble gases He + Ar using an RF compensated Langmuir probe.

2. Experimental setup

The experiments were carried out in the plasma of radiofrequency capacitive discharge. The main part of the experimental setup is the electrodes system, between of them a high-frequency gas discharge is formed. The electrodes are located parallel to each other in a horizontal position. The distance between the electrodes is 30 mm. The RF compensated single electric probe is inserted into the plasma and connected to the measuring circuit through the multicontact connector in the vacuum chamber. The probe has a compensating aluminum electrode and LC resonance filters for the first and second harmonics of the RF field. The contacting part of the probe has a diameter of D = 0.12 mm and length L = 3.3 mm. Argon, helium gases and their mixtures were used as a working medium. As dust particles we used polydisperse Al_2O_3 particles and monodisperse particles of melamine formaldehyde with size of 10 mkm.

3. Experimental results

The electrons temperature distributions in the axial direction in the buffer plasma of pure He and He + Ar mixture were determined using the Langmuir probe. The electron temperatures were measured in the range from 6 mm to 26 mm from the lower RF electrode with increment of 2 mm. Ut was shown an increase in the temperature of the electrons in the sheath of the discharge, due to stochastic heating and acceleration of electrons in the RF field. Addition of argon (3%) to helium (97%) reduces the electron temperature (fig. 1), which in turn significantly affect the properties of plasma-dust formations: structure, the dust charge and the average interparticle distance between dust particles.

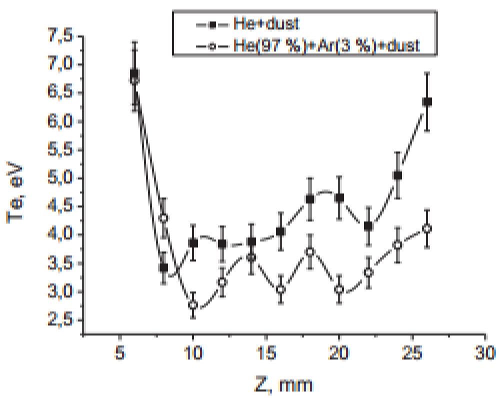

Fig. 1: *The axial distribution of the temperature of electrons in the interelectrode volume in pure He and He + Ar mixture with dust particles. The pressure in the discharge chamber is 0.3 Torr, power is 20 watts.*

References

[1] V.E. Fortov, A.V. Ivlev, S.A. Khrapak, A.G. Khrapak, G.E. Morfill, 2005, *Phys. Rep.* **421** p 1

[2] Gregor E. Morfill and Alexei V. Ivlev, 2009 *Reviews of Modern Physics* **81** p 1353(52)

[3] S. A. Maiorov, T. S. Ramazanov, K. N. Dzhumagulova, A. N. Jumabekov and M. K. Dosbolayev, 2008, *Physics of plasmas* **15** p 093701

[4] M.K. Dosbolayev, A.U. Utegenov, T.S. Ramazanov, T.T. Daniyarov, 2013 *Contrib. Plasma Phys.* **53**, p 426