15th Dusty Plasma Workshop

May 29 – June 1, 2018
The Westin Baltimore Washington Airport – BWI
Baltimore, Maryland, USA

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MECHANICAL ENGINEERING

Contents

Thursday, May 31			Location:
7:00 AM	8:25 AM	**Breakfast**	***All meals and events will take place in the White Oak Room unless otherwise noted.***
7:30 AM	8:25 AM	**Registration**	
8:30 AM		**Welcoming Remarks**	
8:35 AM	8:55 AM	8:35 am. L. Vignitchouk. Dust Charging and Heating Models: High Magnetic Fields and Strong Electron Emission	
9:05 AM	9:25 AM	9:05 am J. Burton. Emergent Bistability and Switching in a Nonequilibrium, Dusty Plasma Crystal	
	9:30 AM		
9:30 AM	9:50 AM	9:30 am. F. Greiner. Nanodusty plasma - the real dusty plasma	
	9:55 AM		
9:55 AM	10:10 AM	9:55 am. O. H. Anaz. Two dimensional dust density wave diagnostics (DDW-D) for the full characterization of a nanodusty plasma	
10:15 AM	10:30 AM	**Coffee Break**	
10:35 AM	10:50 AM	10:35 am. Z. Ding. Nonlinear responses of a strongly coupled dust particle pair under the influence of an ion wake	
	11:00 AM		
11:00 AM	11:15 AM	11:00 am. J. Williams. Measurements of Thermal Effects in the Dispersion Relation of the Dust Acoustic Wave	
	11:20 AM		
11:25 AM	11:40 AM	11:25 am. J. Kong Non-linear effect of a vertical dust chain confined in a glass box	
	11:45 AM		
11:50 AM	12:05M	11:50 am. K. Qiao. Interaction between a dust particle pair and the ion flow modified potential in complex plasma	
	12:10 AM		
12:15 PM	12:30 PM	12:15 pm. M. Chen. Overlapped Plasma Sheath in Narrow Space	
12:35 PM	1:35 PM	**Lunch**	
1:40 PM	2:50 PM	**Poster Session 2:** D. Batryshev, M. Menati, B. Doyle, D. Funk, S. LeBlanc, M. McKinlay, E. Kostadinova, D. Sanford, C. Duée, S. Ashrafi, K. Qiao, C. Knapek, D. Polyakov, V. Shumova, Y. Yerlanuly, T. Schaub, M. Muratov	**Salon 3A**
2:55 PM	3:20 PM	2:55 pm. E. Thomas, Jr. Status and future of the Magnetized Dusty Plasma Experiment (MDPX)	
3:25 PM	3:40 PM	3:25 pm. F. Wieben. Quantitative analysis of laser forces in binary complex plasmas	
3:45 PM	4:05 PM	**Coffee Break**	
4:10 PM	4:25 PM	4:10 pm. T. Hall. Methods for the characterization of imposed, ordered structures in MDPX	
	4:30 PM		
4:35 PM	4:50 PM	4:35 pm. Vyacheslav Lukin. National Science Foundation	
	4:55 PM		
5:00 PM	5:15 PM	5:00 pm. Nirmol Podder. Department of Energy	
5:35 PM	5:50 PM	Board Bus/ Ride to UMBC	Please board one the 2 UMBC buses at the Hotel entry.
5:55 PM	7:15 PM	**Tour of UMBC Labs**	
7:20 PM	7:35 PM	Board Bus/ Return to Westin by BWI	Please board one the 2 UMBC buses at the Circle facing the Fine Arts Bldg.

Poster Session 2

Thursday, May 31, 2018

Synthesis of dust particles by combined discharge at atmospheric pressure.

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Synthesis of nano and micrometer size dust particles from the gas phase in low pressure non thermal plasma is well studied [1-2]. Also, atmospheric pressure plasma is widely used for deposition of thin films, for surface treatment and for the synthesis of nanoparticles [3-4].

In this work the results of experiments on the dust particle synthesis and it's deposition on the surface of a silicon substrate by combining two types of discharge at atmospheric pressure is presented. The experimental setup consists of two pin type copper electrodes connected to the pulsed high voltage source (spark discharge) and two copper tapes wrapped around quartz tube powered by kHz high voltage sinusoidal signal (APP jet). In that case, the spark discharge served as a source of precursor and small-size nanoparticles which in the region of a uniform dielectric barrier discharge of the plasma jet, increased in size (due to coagulation or surface growth) and settled on the surface of the substrate. As a working gas pure Ar and He were used.

The characteristics of the plasma jet and the properties of the deposited nanoparticle contained thin films depend on the material, location and on the geometry of the electrodes of spark discharge and other experimental parameters. Therefore, several types of the location of the spark discharge electrodes have been studied and a dynamic I-V characteristic of a combined discharge was also obtained. The temperature of the substrate surface interacting with a plasma jet flow of combined discharge was investigated by a thermocouple and compared with results of just spark discharge temperature measurements. The particle size distributions were determined as a function of the synthesis time and the spark discharge power. Chemical composition of the of the deposited nanoparticles at different experimental conditions was also obtained by energy-dispersive spectroscopy (EDS).

[1] M. Mikikian , L. Cou¨edel, M. Cavarroc , Y. Tessier, and L. Boufendi, Eur. Phys. J. Appl. Phys. 49, (2010) 13106
[2] T.S. Ramazanov, A.N. Jumabekov, S.A. Orazbayev, M.K. Dosbolayev, M.N. Jumagulov, Physics of Plasmas, 19 (2012) 023706
[3] D. Merche, N. Vandencasteele, F. Reniers, Thin Solid Films 13 (2017) 4219-4236.
[4] I. Adamovich et.al. J. Phys. D: Appl. Phys. 50 (2017) 323001.