THE 1st UKM - ISESCO - COMSATS INTERNATIONAL WORKSHOP ON NANOTECHNOLOGY FOR YOUNG SCIENTISTS

IWYS2016

"INSPIRING INNOVATIONS"

Abstract e-Book

Main organizer: UKM

Co-organizers: ISESCO & COMSATS

In collaboration with MASS

Commercial partnerships

CONTENT

Day 3: 30 November 2016 (Wednesday)

TIME	EVENT	
0900	Electronic Modification of Palladium Nanoparticles with Single Atom Boron Interstitials *Dr. Abdul Hanif Mahadi*	Development of Nano Crystalline Hydroxylapatite and Bio-composites from Novel Sources for Bio-medical Applications *Mr. Md. Rakibul Qadir*
0920	Carrier Relaxation in Mn Doped ZnS Nanowires Studied by Temperature Dependent Photoluminescence Spectroscopy *Mr. Liaquat Aziz*	The Charge Transfer Kinetics of Au-NPs-MWCNTs Modified Glassy Carbon Electrode Surrounded by E-coli *Dr. Shahid Mehmood*
0940	Obtaining of Hydrophobic and Hydrophilic Surface in Plasma AR/CH4 Medium *Mr. Zhunisbekov Askar*	The Role of Graphene in Dye-Sensitized Solar Cell *Dr. Norasikin Ahmad Ludin*
1000	Application of Gamma Radiation in Graphene Oxide Reduction and G/metal Oxide Nanocomposite Synthesis *Assoc. Prof. Dr. Irman Abdul Rahman*	Amino Acid Based Vesicle as Potential Radiosensitizer *Assoc. Prof. Dr. Faizal Mohamed*
1020	Effect of Post Annealing Temperature on Photonic Bandgap of ZnO Nanorods Grown by Chemical Bath Deposition *Dr. Wan Maryam Binti Wan Ahmad Kamil*	Effect of Annealing Strategy on Improved Photoactivity of Cuprous Oxide Nanowire Prepared Using Facile Fabrication Strategy for Solar Water Splitting *Dr. Lorna Jeffery Minggu*
1040	Tea & Poster Session	
1100	**Scientific Writing Workshop** • Impactful Writing *Prof. Dato' Dr. Roslan Abd Shukor* • Dealing with Editors and Reviewers *Prof. Dr. Sarani Zakaria*	
1245	**Closing Ceremony** • Closing Speech by Chairman of IWYS 2016 **- Assoc. Prof. Dr. Mohammad Hafizuddin Hj Jumali** • Speech by ISESCO representative • Speech by COMSATS representative • Closing montage	
1300	Lunch	
1430	Excursion (Melaka)	

Event	Venue
Welcoming Opening Ceremony Dinner Plenary Keynote Workshop	Grand Ballroom
Registration Tea Poster Session	Grand Ballroom Foyer
Lunch	Cempaka
Oral presentation (parallel session)	Grand Ballroom and Dahlia 3 (level 2)

Obtaining of Hydrophobic and Hydrophilic Surface in Plasma AR/CH_4 Medium

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Abstract

Nowadays the wettability of surfaces is a decisive factor in many applications. Control of the hydrophobic or hydrophilic property is a key aspect for microelectronics, light industry, etc. The wettability of the surface generally depends on two factors: surface chemistry and surface roughness. If to use both parameters properly, it is possible to develop superhydrophobic surfaces with a contact angle close to 180°, with very small grazing angle (lotus effect).

In this work, first we got superhydrophobic surfaces using a simple one-step process, based on polymerizing carbonaceous nanoparticles in plasma and deposition on silicon wafer. Nanoparticles arising in plasma polymerization process are typical example of plasma polymers, i.e. materials, which in difference to conventional structured polymers, are not consisted of repeating units. In addition, we researched how wetting characteristics was changing when proceeded in different plasma environments. Experiments have shown that the superhydrophobic surfaces can be converted into superhydrophilic surfaces in means of various plasma processing methods.

Figure 1 shows a schematic diagram of the experimental installation based on a high-frequency (HF) capacitive discharge method. This installation is used for vapor deposition of nano- and microparticles and it consists of a working chamber (1), a HF generator (2) with a self-consistent device (3) and with a measuring unit for determining the value of self-displacement (4). Inside the chamber two electrodes are located: primary electrode (5), to which high frequency alternating voltage is supplied, and power electrode(6), which is grounded. Thus, a high-frequency discharge ignition of plasma within the chamber is formed.

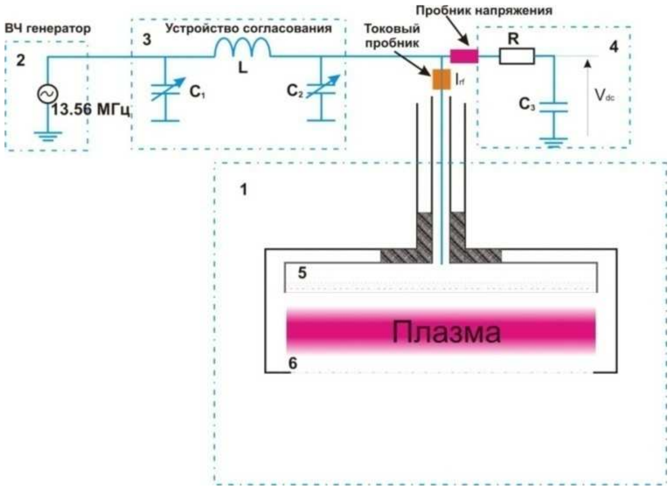
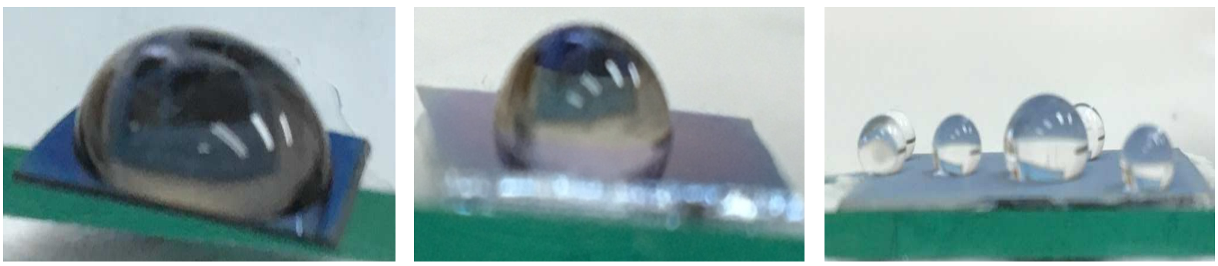


FIGURE 1. The generalized diagram of the RF discharge device

For synthesis of carbon nano- and microparticles gas mixture of methane (2%) and argon (98%) was used with various HF plasma discharge parameters.

The method of synthesis of nano- and microparticles is as follows: the working gas Ar + CH4 is blowed through the hole in glass cover. Gas passing through the mesh electrodes forms a laminar flow between electrodes, and pumped out continuously. When high voltage applied to the electrodes breakdown is arising in the gas, which cause plasma ignition, later gas is decomposed into radicals and ions under dissociation and ionization processes, and during the chemical reactions nanoparticles are synthesized. Then obtained nanoparticles are deposited on the researching surface.

In this work, we focused on the process of growth of nanoparticles and their subsequent deposition. Specific feature of this process is the negative charge of the nanoparticles. Once the particles reach a size of several nanometers, they quickly collect a negative charge (due to the high mobility of the electrons in the plasma). As a result, the particles are held in positive plasma potential, i.e. they are levitating in the discharge, where they continue to grow due to the accumulation of neutral radicals and positive ions. After the plasma turns off, particles lose the negative charge and fall down to the lower electrode. Every time plasma is turned off a certain amount of nanoparticles will fall onto the silicon substrate, which is located on the lower electrode. Thus, the number of particles on a silicon substrate depends on the number of cycles, i.e. the film's hydrophobic feature (contact angle) increases with the number of cycles (Figure 2).



25 cycle | 50 cycle | 75 cycle

FIGURE 2. Photos of water droplets spreading into the surface of carbon-containing nanofilms in three different numbers of cycles: 25, 50, 75. The nanoparticle synthesis time in the plasma is 20 seconds.

At the next stage of research we affected film surfaces with different plasmas in order to change the chemistry of surface. In all cases plasma processing leads to essential changes of wettability. So after plasma processing surface become hydrophilic.

The experimental results show that the hydrophobic features of the film depends on the number of cycles; these superhydrophobic surfaces can be easily converted to the hydrophilic surfaces with simple plasma treatment. Depending on the processing time and the specific parameters of the plasma contact angle can be adjusted from about 160° to values below 10°. This process is accompanied by a rapid increase of the grazing angle.