

Superhydrophobic Surface, Theory, Applications and Technological Importance

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Abstract- Superhydrophobic surfaces and materials received great attention of scientists and engineers due to their unwetting, self cleaning and antimicrobial properties. Hydrophobic surfaces are defined as having sessile water drop contact angle greater than 90°, while surfaces with contact angles larger than 150 ° are rendered as superhydrophobic. Superhydrophobic surfaces, originally inspired by nature, have attracted an increasing scientific and technological interest in the past few decades. In nature superhydrophobic character is common to many plants, such as lotus leaves.

The hydrophobicity can have its source chemically and/or topographically. While the former is explained on the basis of Young's theory, the latter is modeled by Wenzel and Cassie-Baxter models. The Young's model states that a smooth solid surface with a lower free energy has a higher sessile liquid drop contact angle since any isolated system changes to achieve a minimum free energy. Whether a smooth surface is hydrophilic or hydrophobic depends on the solid-liquid and solid-air interfacial energies. Wenzel model states that the contact between a rough solid surface and a liquid is uninterrupted, and the increased surface area of the solid due to roughness causes a chemically hydrophilic surface to have a further decreased contact angle, while on a chemically hydrophobic surface the contact angle rises above that of the smooth surface. However, Cassie-Baxter model assumes air pockets to be trapped between the rough solid surface and the liquid and a chemically hydrophilic surface may become hydrophobic and vice versa depending on the solid-air, liquid-air interfacial energies. The superhydrophobicity is a required property especially for keeping the surfaces free of wetting, and thus avoiding contamination by water based slurries, suspensions, and solutions. These types of surfaces are also classified as self-cleaning due to the difference in advancing and receding contact angles

Superhydrophobicity has stimulated much scientific and industrial interest because of the applications such as stain resistant, self-cleaning, low friction, antifouling, anticorrosion surfaces. Many hydrophobic surface structures have been developed in many fields, such as aeronautics industries, wind turbines, electric power lines, photovoltaic cells, heat exchangers, ice slurry generators are to name just a few. In this study the scientific and technological studies research and development of superhydrophobic surfaces and surface coatings and their theoretical background have been reviewed.

Keywords- superhydrophobicity, surface chemistry, roughness, hysteresis, contact angle



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April 11, 2018 Wednesday	12:00-13:00	Registration
	13:00-14:00	Opening and Speech of Invited Speakers
		Prof. Dr. Güven ÇANKAYA "The Importance of Metrology in Vocational Sciences"
		Prof. Dr. Köksal ERENTÜRK "Innovative Trends on Smart Grids"
14:00-14:30	Coffee Break	

Parallel Sessions					
Hall	Chair	Paper Title	Authors	Speaker	Co-Author
April 11, 2018 Wednesday 14:30 - 16:00	HALL 1 Prof. Dr. Güven Çankaya	107 - Examination of Image Processing Studies and Techniques in Food Sector: A Literature Review	Tolga Hayit, Hasan Erbay and Fatma Hayit	Tolga Hayit	Tolga Hayit
		108 - Optimization of Gluten Free Cookie Flour by Using Response Surface Methodology	Fatma Hayit and Hülya Gül	Fatma Hayit	Fatma Hayit
		111 - Forecast of Daily Average Air Temperature by Artificial Neural Networks: Yozgat Province Case	Tolga Hayit, Ömer Dağıştanlı and Gökalp Çınarer	Tolga Hayit	Tolga Hayit
		146 - ACE I /D, LTA C804A, HPA-1(A/B) AND BETA FIBRINOGEN455 G-A GENE POLYMORPHISMS GENOTYPE AND ALLEL FREQUENCY IN ISCHEMIC STROKE PATIENTS	Ahmet Dönder	Ahmet Dönder	Ahmet Dönder
	HALL 2 Dr. Ali Durmuş	140 - Development of Student Attendance Application for Mobile Devices with RFID and Bluetooth Technologies	Cengiz Özcan, Fazıl Saray and Mustafa Tarı	Cengiz Özcan	Cengiz Özcan
180 - Effect of Carbon Source in Preparation of Heteroatom Doped Carbon Quantum Dots as Fluorescent Probe for Amino Acids	Funda Copur, Erhan Zor, Sabri Alpaydin and Haluk Bingol	Funda Copur	Funda Copur		
181 - A Functionalized-Gold Nanoparticles Based Optical Nanosensor for Biomolecule Detection	Nisa Bekar, Kubra Soganci, İlker Akin, Haluk Bingol and Erhan Zor	Nisa Bekar	Nisa Bekar		
48 - Analysis of Real and Simulation Production Values of Kayseri OIZ Solar Power Plant	Ali Durmuş, Abdulkadir Dağlı, Tahir Karakoç and H. Nuh Sarp	Ali Durmuş	Ali Durmuş		
47 - Detection of Cell Defects in Photovoltaic Systems	Ali Durmuş, Abdulkadir Dağlı and Tahir Karakoç	Ali Durmuş	Ali Durmuş		

Poster Presentations

Paper Title	Authors	Speaker	Co-Author
7 - Embedded Based Home Network Training Equipments for Learning Purposes:The Case of Smart-Home's Assistance Environment "ED-5967"	Nadji Ahmed Zakariya and Rachid Boudour	Nadji Ahmed Zakariya	Nadji Ahmed Zakariya
39 - The Relationship Between Patient Satisfaction and Preference For The Institution In The Delivery Of Health Services	Yusuf Akdemir, Serkan Şen and Merve Şen	Merve Şen	Serkan Şen
103 - Environmental and Sustainable Biocomposite Materials Applications and Properties	Gökhan Açıkbaş and Selçuk Özcan	Gökhan Açıkbaş	Gökhan Açıkbaş
105 - Industrial applications of high technology ceramics in wear	Nurcan Çalış Açıkbaş and Gökhan Açıkbaş	Nurcan Çalış Açıkbaş	Nurcan Çalış Açıkbaş
106 - Superhydrophobic Surface, Theory, Applications and Technological Importance	Selçuk Özcan, Gökhan Açıkbaş and Nurcan Çalış Açıkbaş	Selçuk Özcan	Selçuk Özcan
147 - Removal of Diamazol Red ED-3 from simulated textile wastewater in Membrane Bioreactor (MBR) System	Kadir Özcan and Çağlayan Açıkbaş	Kadir Özcan	Kadir Özcan
179 - Increasing The Bioavailability of Green Tea Polyphenols by Encapsulation	Sevinç Tay and Murat Yılmaztekin	Sevinç Tay	Sevinç Tay
186 - İçten Yanmalı Motorlar için Partikül Filtreleri	Nurcan Çalış Açıkbaş, Gökhan Açıkbaş, Selçuk Özcan and Şeref Soylu	Şeref Soylu	Şeref Soylu
210 - Modular Wireless Sensor for Intelligent Transportation Systems	Sofiane Aouchal and Cherif Tolba	Sofiane Aouchal	Sofiane Aouchal
233 - Solvability of a second order boundary value problem	Nacira Hamidane and Assia Guezane-Lakoud	Nacira Hamidane	Nacira Hamidane
248 - Antioksidanların Antioksidanı Alfa Lipoik Asit (ALA)	Semih Yaman, Zühal Özdemir, Mustafa Şit, Bahri Özer and Oğuz Çatal	Zühal Özdemir	Zühal Özdemir
250 - Kekik Yağı Karvakrol'ün İnsan Sağlığına Etkileri	Semih Yaman, Zühal Özdemir, Mustafa Şit, Bahri Özer and Oğuz Çatal	Zühal Özdemir	Zühal Özdemir
252 - Kafkaslardan Gelen Mucizevi Sağlık: Kefir	Semih Yaman, Zühal Özdemir, Mustafa Şit, Bahri Özer and Oğuz Çatal	Zühal Özdemir	Zühal Özdemir
253 - Domates Likopeninin Kansere ve Oksidatif Stresteki Yeri	Semih Yaman, Zühal Özdemir, Mustafa Şit, Bahri Özer and Oğuz Çatal	Zühal Özdemir	Zühal Özdemir
254 - Sadece Sporcu Besin Takviyesi Olarak Bilinen L-Karnitin'in Mucizevi Etkileri	Semih Yaman, Zühal Özdemir, Mustafa Şit, Bahri Özer and Oğuz Çatal	Zühal Özdemir	Zühal Özdemir
306 - A Bayesian imputation approach for handling missing data in repeatedly measured categorical variables	Oya Kalaycıoğlu	Oya Kalaycıoğlu	Oya Kalaycıoğlu
11 - Investigation of Anxiety Levels of Surgical Patients by Using Trait Anxiety Scale Method	Nuket Ekici	Nuket Ekici	Nuket Ekici

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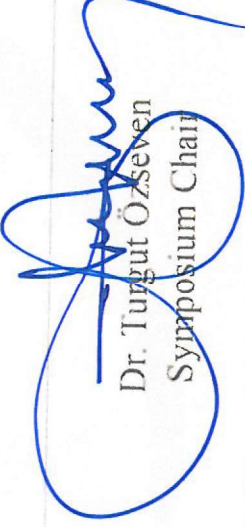
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