

Industrial applications of high technology ceramics in wear

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Abstract- Ceramic materials are characterized by outstanding hardness, extreme compressive strength and elastic modulus, wear resistance, thermal shock resistance, chemical stability and high temperature properties. Therefore they have potential materials to be use at industrial applications. Especially, ceramics show superior performance in tribological applications where wear and friction are very crucial parameters. Alumina (Al₂O₃), silicon nitride (Si₃N₄), silicon carbide (SiC), zirconia (ZrO₂), boron carbide (B₄C), boron nitride (BN) etc. are very well known industrial wear parts. They are used as a cutting tool, sand blast nozzle, metal forming, paper de-watering, valve, ball bearing, seal, grinding media, textile and wire guide, mill liner, hip joint, etc. These kind of industrial ceramic wear parts are produced with special requirements according to in their service conditions.

Tribological materials can be categorized according to the industrial application field. In this case, basically a classification can be made as follows: rolling bearings, biomedical applications, manufacturing, automotive, paper and textile industries. The total amount of engineering ceramics consumed in America and Europe is ~ 225,000 tons. Alumina is the most widely used ceramic among them due to high wear and corrosion resistance as well as it serve cost advantage. After Al₂O₃, SiC, ZrO₂, Si₃N₄, B₄C, BN are used respectively in North America ceramic materials market as a wear part. Ceramic balls used commercially in roller bearings are generally Si₃N₄ due to high fracture toughness. The tribological properties of biomaterials play an important role in the performance of many artificial organs and medical devices. A total of 600,000 knee, hip and shoulder joint operations are performed annually in America. Al₂O₃, ZrO₂, Si₃N₄, SiC, B₄C are used as bone joint coverage part due to high wear and corrosion resistance. In medical applications, screws and bone plates Si₃N₄ are preferred over alumina and zirconia due to their high strength and low density. Manufacturing operations are highly demanding tribological applications. High temperatures, high production rates, desired surface properties and reliability, environmental conditions play an important role in determining the end-life, product surface quality, and surface functional properties. In cutting operations, the insert must have a high abrasion resistance to prevent dimensional changes that can occur to the rubbing tip, a hot hardness to maintain sharp and appropriate cutting edges at high temperatures formed during machining, chemical resistance to avoid reaction with the work piece, high strength and fracture toughness to absorb the impact, high thermal shock resistance to overcome the effects of the continuous heating and cooling cycle. Cars are the most widely used machines today and there are many tribological pieces (pistons, wheels, bearings, transmissions etc.). When the tribological performances of the machines are improved, fuel consumption is reduced, engine power is increased, oil consumption is reduced, the emissions of harmful gases are reduced, durability and reliability and engine life are extended. During the paper production process, the product moves at high speeds (100 km/min) on ceramic dewatering foils during the removal of water from the paper pulp. Desirable properties in this application are abrasion and chemical resistant materials. So ceramic materials have potential in paper production.

Keywords- wear, tribology, biomedical, bearing, automotive, ceramic



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REGISTRATION AND OPENING		
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 Dağistanlı 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 Tari	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 Açıköz	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 Calis Acikbas, Gokhan Acikbas, Selcuk Ozcan and Seref 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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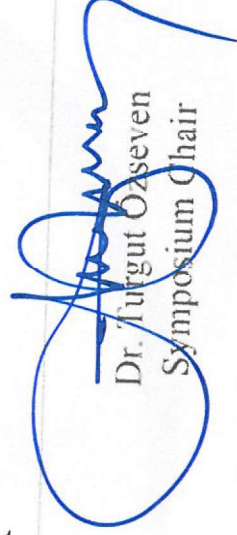
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- » Keynote Speaker (Prof. Dr. Güven Çankaya)
- » Keynote Speaker (Prof. Dr. Köksal Erentürk)

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