2018 X-ACADEMY SHENZHEN CONFERENCE SCHEDULE

2018 4th International Conference on Mechanical Structures and Smart Materials (4th ICMSSM2018)

Shenzhen, China

September 22-23, 2018

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Simple Version of the Schedule

September. 22 p. m.

Registration at the Hotel Lobby (13:30-17:00)

September. 23 a. m.

- Keynote Speech1(9:00-9:30)
- Keynote Speech 2(9:30-10:00)
- **Coffee Break (10:00-10.15)**
- Oral Presentation(10:15-12:00)

Session 1

•Lunch (12:00-13:00)

September. 23 p. m.

- Keynote Speech 3 (13:00-13:30)
- Oral Presentation (13:30-14:00)

Session 2

- **Coffee Break (14:00-14:15)**
- Oral Presentation (14:15-15:00)

Session 2

Committees

Editorial Chair

Tei Woo Chiat, Universiti Malaysia Terengganu, Malaysia

Conference Secretary

Hedy He, Shanghai x academy Co.Ltd, China

Committees

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Siamak Hosseinzadeh,Islamic Azad University,Iran
Chih-Ta Tsai,National Cheng Kung University,Taiwan

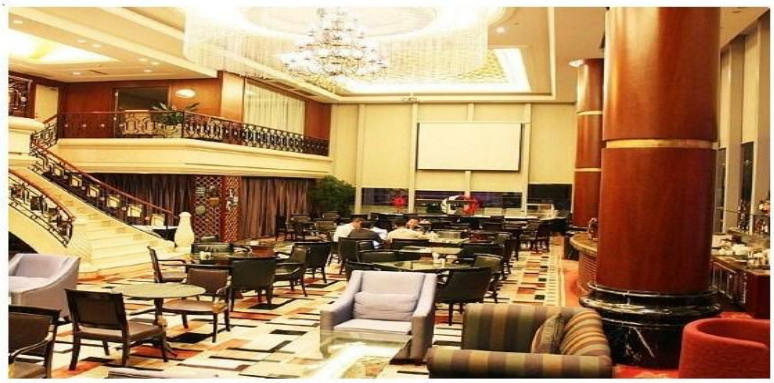
Venue

Conference venue: Shenzhen Century Plaza Hotel

Add: No. 4001 Chunfeng Road, Luohu District, Shenzhen, China.

Phone: 0755-82320888

Web: http://www.centuryshenzhen.com



Note:

1. All the participants are strongly advised to arrive before 8:50, September 23, 2018.

2. Certificate of Participation can be collected at the registration counter.

3. Please copy PPT files of your presentation to the secretary when registration.

4. The organizer doesn't provide accommodation, and we suggest you make an early reservation.

5. If you want to deliver oral presentation but your paper is not in the session list, please contact us by Email: cfp@icmssm.org (for ICMSSM2018)

Instruction about Oral Presentation

Devices Provided by the Conference Organizer:

Laptops

Projectors & Screen

Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: about 10 Minutes of Presentation and 3 Minutes of Q&A.

Keynote Speech

September 23, 2018 (9:00-10:00) at 7th floor, Century Plaza Hotel(1)

Keynote Speech 1 9:00-9:30

Prof. Lee D. Wilson

University of Saskatchewan, Canada

Speech Title:"Development of Responsive Biopolymer Materials for Environmental Contaminants"

Wilson is an Associate Professor with the Department of Chemistry at the University of Saskatchewan with research interests that cover diverse areas of physical chemistry, materials science and environmental chemistry. Current efforts are focused on the development of new biopolymer materials for studies related to molecular recognition and interfacial phenomena. This research contributes significantly to adsorption science and technology that relate to important questions relevant to human health, water security, and energy security.

Keynote Speech 2 9:30-10:00

Prof. Mohan Reddy Moola

Curtin University, Malaysia

Speech Title:"TPerformance of newly developed end mills on advanced materials"

Dr. Mohan Reddy Moola working as a Associate Professor in Mechanical Engineering Department, Curtin University Sarawak Campus. He obtained his PhD (Manufacturing area) from Curtin University and Master Degree (Mechanical Systems, Dynamics and Control) from I.I.T. Kharagpur. He has been involved in teaching, research, and

students' supervision at undergraduate and postgraduate level for the last 17 years. His current research focused on the machining of advanced materials and ceramics. He has more than 30 publications in reputable international journals and conference proceedings. He is the project leader for couple of funded projects by the Ministry of Higher Education, (MOHE), Malaysia.

10:00-10:15	Photo & Coffee Break

Session List

Session 1 (session chair : Professor Nohyu Kim)

September 23, 2018 (10:15-12:00) at 7th floor, Century Plaza Hotel(1)

1. ID: 5
Title: Monitoring damages in a CNT/glass fiber/epoxy composite through resistance changes
Authors: C. S. Shin,Sheng-jie Sun
Abstract: Reinforcing the resin matrix of conventional fiber composites with carbon nanotubes (CNTs) to form multiscale hybrid composites can render it electrically conductive as a percolated network of CNTs forms. It has been demonstrated in a cross-ply CNTs/glass fiber/epoxy composites that the resistance changes during a repeated tensile loading-unloading is associated with the matrix cracking in the 90° laminae and this offers a mean for monitoring the damage development in the hybrid composite. In this work, a quasi-isotropic [0/-45/90/45]s CNTs/glass fiber/epoxy composite has been fabricated using the vacuum assisted resin transfer molding method. Resistance changes over different parts of the specimen gage length are monitored under repeated loading-unloading tensile tests and high cycle fatigue tests. The specimen gage length is divided equally into 6 regions. Resistance monitoring is done indirectly by measuring the potential drop (PD) across each of these regions while feeding a constant current of 0.15 mA through the specimen. This allows different local regions to be measured at the same time without causing cross-channel interference. During both tensile and fatigue tests, the specimens are periodically unloaded to 800N and 50N for PD measurements. For tensile tests, the unloaded PDs changed little until

loading to beyond 50% of the tensile strength. Thereafter, they increase more markedly and the PD across a particular region will increase more prominently than the others. Final fracture will indeed occur in this region. Moreover, the unloaded PD at 800N always reveals such prominent PD increase earlier than that at 50N. This is reasonable as any damage and defects will be held open by the large loading and exhibit more marked increase in resistance. For all tensile specimens, the PD across the final fracture region changes by 2%~8% while its change across the whole specimen is 40-72% no matter final fracture occurs inside or beyond the gage length. This suggests considerable damage has invariably occurred in the region beyond the gage length. Stress concentration ahead of the gripping end tabs may accounts for this phenomenon. For the fatigue tests, the PDs across all regions increase gradually initially. Beyond a certain life fraction, unloaded PD across the region of the future final fracture will shows an abrupt rise. Such abrupt rise is more marked and occurs earlier the higher the cyclic load. Again, the unloaded PD at 800N can detect damage earlier than that at 50N. For all fatigue tests, the percentage changes in PD across the region of final fracture varies from 18%~51% while that across the whole specimen changes by 6-39%. This is in marked contrast to that observed in tensile tests, suggesting that damage initiates more evenly throughout the specimen and the one that gradually grow to fracture causes a large localized resistance change. By monitoring the unloaded PDs, not only the qualitative development of damage in the hybrid composite but also the relative severeness of damage at different regions can be revealed.

2. Paper ID: 8
Title: Optical Absorption Spectroscopy of DNA-Wrapped HiPco Carbon Nanotubes
Authors: Lijun Wang,Kazuo Umemura
Abstract: Optical absorption spectroscopy provides evidence for individually dispersed carbon nanotubes. A common method to disperse SWCNTs into aqueous solution is to sonicate the mixture in the presence of a double-stranded DNA (dsDNA). In this paper, optical characterization of dsDNA-wrapped HiPco carbon nanotubes (dsDNA-SWCNT) was carried out using near infrared (NIR) spectroscopy and photoluminescence (PL) experiments. The findings suggest that SWCNT dispersion is very good in the environment of DNA existing. Additionally, its dispersion depends on dsDNA concentration.

3. Paper ID: 4
Title: Ultrasonic Evaluation of Young's Modulus for Reduction of Brake Squeal Noise
Authors: Nohyu Kim, Woochan Kim
Abstract: The elastic properties of friction materials in brake linings are important design parameters because modulus variations may be significant in noise generation of braking systems. This paper is to describe about ultrasonic estimation of Young's modulus of brake linings concerned with squeal noise problem for commercial trucks. Phase velocity of ultrasound propagating through brake lining was measured to calculate Young's modulus based on elastic relations of acoustic waves with material properties. Two kinds of brake lining samples were produced with the same composition by different

manufacturing process, one of which is a traditional product and the other is an advanced one developed for brake noise reduction. Five rectangular samples were cut out from each type of brake linings and machined for ultrasonic test. Acoustic pulse of 500KHz was applied to each sample to calculate the time-of-flight(TOF) for the measurement of wave velocity and Young's modulus. The results of ultrasonic test indicate that the low noise brake samples have a less deviation of Young's modulus than the traditional brake samples. This agrees with previous researches and FEM analysis that Young's modulus variation of brake linings affects the squeal propensity and the instability of brake system.

4. Paper ID: 7
Title: Influence of Graphene Nanoplatelets on Silica-filled Natural Rubber Composites: Dispersion Mixing and Effect on Thermal Stability, Rheological and Mechanical Properties
Authors: Methus Charoenchai,Siree Tungbunsuk,Wirunya Keawwattana
Abstract: In this study, graphene nanoplatelets C750 (GnPs-C750) was introduced to silica-filled natural rubber composites (NR/SiO_2/GnPs) by simple latex mixing process and coagulation following conventional vulcanization process to investigate the outstanding properties compared to individuals. The SiO_2 and GnPs contents were fixed at 40 and 2 parts per hundred of rubber (phr), respectively. The results showed that in the presence of GnPs in SiO_2-filled natural rubber composites, the thermal stability of the composite was improved. Meanwhile, the rheological properties including minimum torque and maximum torque were increased and cure characteristics including scorch time and optimum cure time were decreased related to cure rate index was greater than SiO_2 individual. The influence of GnPs on the mechanical properties was investigated. The results showed that it was not significantly changed in mechanical properties.

5. ID: S107
Title: Design and analysis of Galfenol cantilever energy harvester
Authors: Aihua Meng,Mei Zhang,Wenwu Pan
Abstract: In recent years, with the development of science and technology, the energy problem has been paid more attention from experts and scholars of all walks of life. Mechanical vibration is the most popular form of energies in nature, and not be affected by climate, time or places. A variety of energy harvesting technologies emerge in recent decades. The magnetostrictive material Galfenol has high energy density, high magneto-mechanical coupling coefficient, and good mechanical performance, which made it suitable for vibration energy harvesting.
According to the electromechanical conversion principle, the constitutive relation of Galfenol is built. The magnetization model is also established on the base of the hysteresis model of Galfenol. Combined the electromechanical coupling model, the constitutive relation of Galfenol with the electromagnetic induction law, the mathematical model of Galfenol vibration energy harvester is established.
The performance comparison of four types of cantilever beam，rectangular, trapezoidal, triangular and hyperbolic curve，are conducted through theoretical calculation，under the bending vibration analysis and forced vibration analysis of the cantilever beams. The

inherent frequencies of these beams and the output voltage response to these devices under the action of different vibration frequencies are determined with Ansys software.
Using the Matlab software, the simulation output results of the mathematical vibration energy harvesting model for these four different shapes beams are obtained. When the vibration amplitude of excitation is 20*um* and the vibration frequencies are their first order natural frequency of these beams respectively, the simulation results of the peak-to-peak induction voltage values are 441.7mV, 592.4mV, 736mV, 820.7mV, respectively.
Finally, the experiments of these four kinds of prototype output performance contrast have been conducted. The experimental results show that the highest output peak-to-peak induction voltage value of these shapes beams is the hyperbolic type energy harvester, the average value is 815.5mV.

6. Paper ID: S109
Title: A Facile Approach to Enhance the Thermoelectric Properties of PEDOT:PSS through Post-treatment with Nitric Acid
Authors: MYINT May Thu Zar,HADA Masaki,NISHIKAWA Takeshi,KYAW Aung Ko Ko,HAYASHI Yasuhiko
Abstract: Recently, thermoelectric materials have become a great interest in energy conversion devices because of its ability to direct conversion of waste heat to electricity through Seebeck effect [1]. Poly (3,4-ethylenedioxythiophene) :poly (styrenesulfonate) (PEDOT:PSS) has become promising one due to its unique properties including excellent stability, easy processability, flexibility and transparency [2]. The efficiency of direct conversion of heat to electricity depends on the dimensionless figure of merit, $ZT = S^2\sigma T/\varkappa$, where S is the Seebeck coefficient, σ is the electrical conductivity, T is the absolute temperature and $\varkappa$ is the thermal conductivity. Power factor, $P = S^2\sigma$ is also commonly used to determine the efficiency of thermoelectric materials instead of ZT when the thermal conductivity of the materials is significantly low [3]. Several methods such as dipping the PEDOT:PSS films in the polar solvents or acids and dropping polar solvents or acids on the PEDOT:PSS films have been used to improve the thermoelectric properties of PEDOT:PSS [4,5]. In our work, we report a facile and cost-effective method to improve the thermoelectric properties of PEDOT:PSS through post-treatment with nitric acid (HNO_3). Three different post-treatment methods are also reported comparatively to get the optimum thermoelectric properties of PEDOT:PSS. The maximum power of 94.3 $\mu Wm^{-1}K^{-2}$ is obtained for the PEDOT:PSS film treated with HNO_3 followed by nitrogen gas (N_2) passing while pristine PEDOT:PSS shows the power factor of 0.068 $\mu Wm^{-1}K^{-2}$ at 150℃. Meanwhile, the PEDOT:PSS films are treated with the same procedure with HNO_3 and then dried in the vacuum chamber and another one is immersed in deionized (DI) water. In that case, the optimum power factor measured at 150℃ is 69.6 $\mu Wm^{-1}K^{-2}$ and 45.5 $\mu Wm^{-1}K^{-2}$ for vacuum dry and DI water washing, respectively. Therefore, the PEDOT:PSS films treated with HNO_3 followed by passing with N_2 gas give the highest electrical conductivity resulting in the highest power factor value. The improvement in electrical conductivity is attributed to the removal of insulating extra

PSS from PEDOT:PSS and the conformational change of the polymer chain.

Keynote Speech

September 23, 2018 (13:00-13:30) at 7th floor, Century Plaza Hotel(1)

Keynote Speech 3 13:00-13:30

Ms. Amany Moustafa Gouda

Egyptian Atomic Energy Authority, Egyptian

Speech Title: "Formation mechanism of periodic nanograting structure under the effect of relativistic and nonrelativistic laser beam"

Ms. Amany Moustafa Gouda is a PhD student in Nagoya university , Japan. She is working in the Egyptian Atomic Energy Authority from 2006 until now. Her Ph. D work has covered the simulation studies for formation mechanism of periodic nanograting structure by using a relativistic and nonrelativistic laser beam. She could publish in different topics due to her experience in plasma physics and its related applications such plasma accelerators, plasma role in forming periodic nanograting structure, etc. MS. Amany has remarkable publications in IEEE, Journal of Plasma Science and Technology, Appl. Phys. A, Plasma and Fusion Research.

Session 2(session chair : Professor Chunlai Tian)

September 23, 2018 (13:30-14:00) at 7th floor, Century Plaza Hotel(1)

1. Paper ID: S117
Title: Design of Automatic Billiard Sports Service Machine
Authors: Luo Sichun,Wen Tanggen,Lan Xiang, Gong Jin,Tian Chunlai
Abstract: The billiard sports service machine which adapts to most of the billiards matches now is designed in this paper. It has strong environmental adaptability with the purposes of saving manpower, high efficiency and smooth transport of billiards. It has five main parts, such as billiards collection part, billiards sorting part, billiards push up part and billiards placement part. It is operated according with the working principles of billiard service machine. It uses the color sensor to identify the color of billiard balls. It applies the single chip microcomputer to control the mechanical actors. It makes use of the rubber sucker and the vacuum pump to grab the billiard balls. The waiting time for the new balls arrangement is shorten significantly to help players enjoy the game. The design with the feasibility plan is provided for the realization of the service for the automated billiard sports.

2. Paper ID: S118
Title: Design of Curling Sports Service Robot
Authors: Tian Chunlai,Chen Qideng,Feng Quanquan, Luo Sichun
Abstract: In order to implement handling and unmanned maintenance for curling in sports, a service robot is designed in this paper. It could save professional labor costs and improve work efficiency for the curling sports service with strong usability. Through analysis on the curling's feature, the mechanical model of the service robot is established by three-dimensional CAD software. The robot consists two functional sub robots. One is the curling handling robot and the other one is the curling maintenance robot. The design includes the robotic arm systems, maintenance systems, intelligent identification, industrial CT inspection systems and pneumatic control systems. Referred to the mechanical structure of the excavator, the mechanical arm movement is driven by the cylinder. The handling curling has strong stability. The maintenance system adopts a circular layout design. The simulated motion of the design is carried out with the rationality of mechanical structure analyzed. It can make reasonable serve sports and improve work efficiency significantly.

3. ID: S120
Title: Buffer-facilitated epitaxial growth of ZnO on c-plane sapphire
Authors: Guan-Wen Chen,Yan-Ru Lin
Abstract: The epitaxial growth of zinc oxide (ZnO) films on c-plane sapphire by sputtering was investigated. The improvement of the crystal quality of the ZnO was conspicuous by using a thin compliant buffer of titanium nitride (TiN) sandwiched between ZnO and sapphire. X-ray θ-2θ scan data elucidate the crystallinity of films. High-resolution transmission electron microscopy (HRTEM) and the electron diffraction pattern identified the epitaxial relationships among ZnO/ TiN/ Sapphire are

$$(0002)_{ZnO} \,||\, (111)_{TiN} \,||\, (0006)_{Sap} \text{ plus } [10\bar{1}0]_{ZnO} \,||\, [4\bar{2}\bar{2}]_{TiN} \,||\, [11\bar{2}0]_{Sap}.$$

It was found that the temperature is an essential issue when depositing ZnO on TiN.

The best epitaxial quality can be obtained at 300 ℃ since higher or lower temperature would degenerate. The reasons were discussed in this report.

14:00-14:15	Coffee Break

Session 2(session chair : Professor Chunlai Tian)

September 23, 2018 (14:15-15:00) at 7th floor, Century Plaza Hotel(1)

1. ID: S121 **Title:** Epitaxial Growth of ZnO on GaN by hydrothermal method: From 1-dimensional to 2-dimensional structures **Authors:** Pin-Hong Chen,Yan-Ru Lin **Abstract:** Epitaxial zinc oxide (ZnO) films were grown on gallium nitride (GaN) by low-temperature (< 100 ℃) hydrothermal method. With the same crystal structure and similar lattice constant, ZnO is easy to grow epitaxially on GaN. Because of a lattice mismatch along a-axis about 1.88%, the hetero-epitaxy of ZnO on c-plane of GaN usually grows with one-dimensional structure by Stanski-Krastanov growth mode (layer to island). It was found that the temperature for the hydrothermal process is an essential issue. ZnO grows more rapidly along c-direction than a-direction at the temperature near the boiling point of water. Decrease the temperature will reduce the growth rate for all direction, but the reduction is more sensitive along c-direction than other direction. Then, 2-dimensional epitaxial ZnO films were achieved.
2. Paper ID: S133 **Title:** Effect of Compressive and Shear Deformation of 2.5D Preform on its Stiffness of Composites **Authors:** Fangbin Lin, Ying Dai, Hanyang Li, Yang Qu, Wenxiao Li

Abstract: Transverse compaction and in-plane shear deformartion are the dominative deformation mode for woven preform during forming process. A full finite element model of the 2.5D woven composites has been established by the computed tomography (CT) in this paper. Based on the energy method, the effective orthotropic/anisotropic stiffness coefficients Cij are calculated by performing a finite element analysis (FEA) of this full cell model. Using this model, the effects of the compaction and shear deformation of the 2.5D woven preform on the composites stiffness are investigated in detail. Compared the results of the static tensile tests, the rationality of the model and the method is verified.

3. Paper ID: S134
Title: Study on Mechanical Properties of 3D4d Woven SiCf/SiC Composites Based on Experiment and Model Prediction
Authors: Xingkeng Shen, Mingyuan Li, Ying Dai, Xingui Zhou
Abstract: The mechanical properties of KD-II type silicon carbide fiber braided three-dimensional four-directional (3D4d) SiCf/SiC woven composites fabricated by PIP method were studied in this paper. The computed tomography (CT) technology was used to obtain the cross section shape and orientation of fiber bundles inside woven composite materials, and digital image correlation (DIC) method was used to measure deformation, during the tensile tests of the composites. Theoretical and numerical methods were adopted to predict the mechanical properties of the 3D4d SiCf/SiC woven composites, and the effectiveness of different methods was discussed based on the comparison of results obtained from the experiments and prediction model.

4.Paper ID: S136
Title: The Compressive Strength of Coconut Fibers Reinforced Nano Concrete Composite
Authors: Riana Herlina Lumingkewas, Akhmad Herman Yuwono,Sigit Pranowo Hadiwardoyo, Dani Saparudin
Abstract: The compressive strength of the concrete reviewed in this study uses nano-silica and coconut fibers. The addition of natural fibers to concrete contributes to the construction of sustainable and environmentally friendly building materials. The testing method carried out physically and mechanically. Testing the compressive strength of the nano concrete composite with variations in the amount of nano-silica which substituted with cement. Using variations of nano-silica composition, namely 0%, 1%, 1.5%, and 2% added with coconut fiber to determine the effect of compressive strength from composite nano-concrete. The results obtained are the optimal value of concrete compressive strength with nano-silica is the addition of 2% nano-silica, which increases 43% of standard concrete. Moreover, on concrete with the addition of nano-silica and the addition of coconut fibers 1% test results in concrete compressive strength which is optimal in the addition of 0.5% nano-silica, which is 58% increase from normal concrete. The conclusion of this study that the addition of nano-silica and reinforced with coconut fiber will increase the compressive strength of concrete, this is an excellent composite material to get environmentally friendly building materials using.

5.Paper ID: S111
Title: Evaluation of Surface Roughness and Tool Wear in High Speed Machining of Inconel 718.
Authors: Mohan Reddy Moola, Viviana Yong Chai Nie
Abstract: This research work considered the high speed milling operation of Inconel 718 using a 4 flute solid carbide end mill tool without the use of coolant. Inconel 718 is a Nickel based Heat Resistance Super Alloy (HRSA) that is vastly used in the aerospace industries due to its excellent corrosion resistance and good mechanical properties. However, Inconel 718 is considered as a difficult-to-cut super alloy, which poses several problems when machining the material. The aim of this work is to investigate the effect and the influence of cutting parameters (feed rate, spindle speed, and depth of cut) on the quality of the machined surface as well as to evaluate the tool wear after machining. This evaluation of the surface roughness was done using a CNC milling machine at various parameters range for the values of feed rate (50-150 mm/min), spindle speed (2000-4000 RPM), and depth of cut (0.05-0.1 mm). The experiment was designed using Response Surface Analysis Method with Central Composite Design (CCD) to optimize the experimentation. The resulting tool wear and surface roughness after high speed machining were then analysed using ANOVA to determine the cutting parameters which is most affecting the surface roughness.

6. Paper ID: 15
Title: Elastic Constants Determination of Composite Plates Using Measured Strains
Authors: C. Y. Huang , FULL T. Y. Kam
Abstract: A strain-based elastic constant identification method is proposed to determine the elastic constants of fiber-reinforced composite rectangular laminates using three measured strains of the plates subjected to uniaxial load testing. In the proposed method, the measured normal strains in 0°, and 45°, and 90° directions, respectively, of the plate made of one composite material subjected to uniaxial tensile testing are used to identify four elastic constants of the constituent composite material via a two-level optimization approach. The objective function used for constructing the two-level optimization problem consists of the sum of the differences between the experimental and theoretical predictions of the three strain components and a strain restraining function, which is used to help even up the effects of the measured strains on the identified elastic constants. The accuracy of the proposed method has been verified via an experimental approach.

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Thanks again for all your great attention and kind support to ICMSSM2018

Thank you for all of your contributions!