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June 23-24, 2018



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Resource Development and Social Responsibility

June 23-24, 2018

Hotel Mystays Ochanomizu Conference Center

Book of abstracts

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Conference Coordinator

- 2. Mr Leon Yap**
Conference chair

- 3. Hideo Owan**
Conference Coordinator

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Conference Chair Message

Dr Ishida Otaki

International Conference on “International Conference on Business Sustainability, Human Resource Development and Social Responsibility” serves as platform that aims to help the scholarly community across nations to explore the critical role of multidisciplinary innovations for sustainability and growth of human societies. This conference provides opportunity to the academicians, practitioners, scientists, and scholars from across various disciplines to discuss avenues for interdisciplinary innovations and identify effective ways to address the challenges faced by our societies globally. The research ideas and studies that we received for this conference are very promising, unique, and impactful. I believe these studies have the potential to address key challenges in various sub-domains of social sciences and applied sciences.

I am really thankful to our honourable scientific and review committee for spending much of their time in reviewing the papers for this event. I am also thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. We the scholars of this world belong to the elite educated class of this society and we owe a lot to return back to this society. Let’s break all the discriminating barriers and get free from all minor affiliations. Let’s contribute even a little or single step for betterment of society and welfare of humanity to bring prosperity, peace and harmony in this world. Stay blessed.

Thank you.

Dr Ishida Otaki
Conference Chair
BSHDS-Secretariat, 2018

Conference Schedule

DAY 01 Saturday (June 23, 2018)

Venue: Room 1

09:00 am – 09:10 am	Welcome Reception & Registration
09:10 am – 09:20 am	Opening Ceremony
09:20 am – 09:30 am	Welcome Remarks – Conference Coordinator TARIJ
09:30 am – 09:40 am	Introduction of Participants
09:40 am – 9:50 am	Group Photo Session
09:50am – 10:00 am	Grand Networking Session and Tea Break

DAY 01 Saturday (June 23, 2018)

Session 1 (10:00 am – 12:30 pm)

Venue: Room 1

Track A: Business, Economics, Social Sciences and Humanities

BSHDS-JUNE-101	The Role of Information Technology and Firm Motivation in Green Supply Chain Management and its Performance	Connie K. W. Liu,
BSHDS-JUNE-110	The Impact of Management and Auditor Gender on Earnings Management: Evidence from China	Chia-Yu Chiang
BSHDS-JUNE-111	The Impact of Taiwan-Japan Open Sky Policy on Efficiency of Traditional Airlines and Low-Cost Carriers	Hao-En Sheng
BSHDS-JUNE-112	Trust, Guanxi and Cooperation in Buyer-Supplier Relationships	Pei-Hsuan Tsai
BSHDS-JUNE-115	Outpatient Patient Satisfaction Scale Construction for Taiwan Hospitals	Fang-Min Fu
BSHDS-JUNE-117	Exploring the Whether Adolescents Perception of Deviance or Non-Deviance When Using the Internet Increases or Decreases Deviant Behavior While Using the Internet	Annie J. Daniel.
BSHDS-JUNE-119	Small Enterprises and Environmental Sustainability: A Review of Recent Developments	Olamide Oluwaseyi Oguntoye
BSHDS-JUNE-123	Food safety and vulnerability perceptions of consumers in Taiwan	Pao-Hui Lin
BSHDS-JUNE-124	Analysis of Differences in Core Competencies among Major, Grade and Gender of Korean University Students	Lee Kyunghwa
BSHDS-JUNE-125	B Corporations in Taiwan	Juei-Chi Chang

Lunch Break (12:30 to 01:30 pm)

DAY 01 Saturday (June 23, 2018)

Session 2 (01:30 am – 03:30 pm)

Venue: Room 1

Track B: Engineering, Technology & Applied Sciences

DTAS-JUNE18-101	Electrical Properties and Electromechanical Responses of Pullulan Hydrogels for Soft Actuator Application	Kochakorn Saeah
DTAS-JUNE18-102	Electrically Controlled Drug Release from Carboxymethyl Cellulose Hydrogel	Kittipon Sangsuriyonk
DTAS-JUNE18-103	Fabrication of Graphene Oxide/Hyaluronic Acid Composite Hydrogels for Electrically Controlled Transdermal Drug Delivery System	Nuttawadee Sittisanguanphan
DTAS-JUNE18-105	Electrically Controlled Release of Diclofenac Sodium Salt from Dextran Hydrogel	Jirawat Thanokiang
DTAS-JUNE18-109	Improved Adaptive Non-Uniformity Correction in Infrared Focal Plane Arrays	Ayoub BOUTEMEDJET
DTAS-JUNE18-110	Fabrication of 3D Printed Smart Key with Embedded Sensor and Electronics Using a Multi-Material Smart 3D Printer	Kyung Hyun Choi
DTAS-JUNE18-114	Self-Stabilizing Distributed Algorithm for Enabling Completely Local Recovery	Jinho Ahn
DTAS-JUNE18-104	Deproteinized Natural Rubber Latex (DPNR) Foam for Controlled Drug Release	Kamonpan Ruangmak

Closing Ceremony

(03:30 - 04:00 pm)

List of Conference Attendees

The following Scholars/ practitioners/educationist who don't have any paper presentation, however they will be attending the conference as delegates & observers.

Sr. No	Official ID	Name	Affiliation Details
01	TKS-368-102A	Dawn Bonsor,	Alumni of Concordia university in Montreal, Quebec, Canada
02	TKS-368-103A	Randall Dagenais	Alumni of Concordia university in Montreal, Quebec, Canada
03	TKM-368-101A	Julie Ibrahim	Family physician in Blainville, Quebec, Canada
04	TKM-368-102A	Dr Anas Nseir,	University of Montreal

DAY 02 Sunday (June 24, 2018)

City History and Discussion Session

The purpose of the second day conference will be for the participants to learn more about the local history and culture, or get to know the other participants better. Therefore,

Option 1: City History and Culture Tour: All the participants are free to organize your own group tours together and get to know each other better.

Option 2: Discussion Session: All the participants are free to make group discussions on behalf of your same research interest and get a chance to cooperate in the future Research.

**TRACK A: BUSINESS, ECONOMICS, SOCIAL
SCIENCES AND HUMANITIES**

The Role of Information Technology and Firm Motivation in Green Supply Chain Management and its Performance

Connie K. W. Liu^{1*}, Amanda M. Y. Chu²

Abstract The recent deterioration of the environment is undeniable and is an on-going, leading issue in the global society. Business organizations are, unfortunately, the main contributors of this destruction. In particular, the manufacturing industry and its accompanying supply chain are the major polluters emitting CO₂ and other greenhouse gases, intoxicating the earth. Thus, there is an increasing pressure for governments all over the world to legislate the industry. Feeling the pressure, enterprises are motivated to undergo green transformation causing a change in the basis of competition. One of the enabler and key resource of green transformation is the advancement of information systems (IS) and technologies (IT) because information systems facilitate affordable organization change. The systems also allow the monitoring and measuring of change and organization performance and most modern organizations are depending on it regardless of their green initiatives because it is a great contributor to productivity improvement as well. However, literature studying both GSCM and GISIT is not common. In SCM literature, there are relatively few papers which examine IT as an enabler of GSCM. On the other hand, most GISIT literature focuses on specific type of systems and their related issues but rarely do they establish the impact of GITIS on the performance of the adopting organizations. Therefore, this study has a significant contribution in bridging the important gap of GSCM, GISIT and their impact on different aspects of organization motivation and performance in the context of product design, which is where sustainability starts to be implemented in the entire supply chain. We look at the intersection of these important parts of modern commercial world, in particular the moderating effect of Green ISIT, These results have important managerial implications: that companies are indeed under pressures to implement sustainability in their organization through GSCM, and at the same time it could help them increase different aspects of their performance. Governments and practitioners should encourage the implementation of GSCM in order to protect the environment and help organizations to improve their performance as well. Information technology on the other hand, enhances the operational and economic performance of the adopting organizations through the implementation of GSCM. Thus, any organization which is considering “going green” could start adopting green information systems and technology, which could help increase their efficient and effectiveness. Lastly, this working paper addresses the research gap within the fields of both supply chain management and information technology management providing a new insight into how information technology could be related to green supply chain and its motivation and performance.

Keywords: Information, Global, Destruction

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The Impact of Management and Auditor Gender on Earnings Management: Evidence from China

Yu Shan, Chang^{1*}, Chia-Yu Chiang²

Abstract We examine the joint impact of top management gender and auditor gender on earnings management practices, including both accrual-based management(ABM) and real activities manipulation(RAM). Employing a Chinese setting characterized by a male-dominant culture and emerging economy, we find that firms led by female-dominant management have higher discretionary accruals but conduct less RAM when the firms are audited by male auditors, compared to firms led by male-dominant management. The differences in ABM and RAM practices disappear when the firms are audited by female auditors no matter whether the firms are led by female-dominant or male-dominant management. Our results indicate that firms may have different preference of earnings management methods, depending on the female representation in top management. But the difference is constrained by female auditors. We further find that the association is primarily observed in firms audited by non-industry-expert auditors. The gender impact disappears if firm hire industry-expert auditors. These findings have implications for academics, practitioners, analysts, and regulators.

Keywords: Earnings Management, Real Activities Manipulation; Accrual-Based Management; Gender; Industry-Expert Auditor; Auditor's Industry Specialty.

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The Impact of Taiwan-Japan Open Sky Policy on Efficiency of Traditional Airlines and Low-Cost Carriers

Hao-En Sheng^{1*}, Chia-Yu Chiang²

Abstract With the development of Taiwan's economy, traveling abroad is one of the choices for Taiwanese people to relax for leisure, and business travelers are also moving in major cities in Asia, so the aviation industry has rapidly expanded its territory. The reciprocity of the open-sky policy has made the bridge between countries even closer, and passengers can more easily reach to the destination where they want to go. Therefore, it is an important issue to explore that open sky policy affects efficiency of the aviation industry. This study uses data envelopment analysis to analyze the impact of Taiwan's implementation of the Open Skies Policy with Japan on the performance of traditional aviation and low-cost aviation. After the Taiwan-Japan Open Skies Policy Agreement is signed, the performance of each company will grow significantly, among which, the traditional aviation Performance is better than low-cost carriers after opening sky in Taiwan and Japan. However, as low-cost airlines operate in the market, they were initially inefficient, but the passenger boarding rates and efficiency values increased with year-on-year growth, exceeding the efficiency value of traditional aviation, is just around the corner.

Keywords: Open Sky Policy; Efficiency; Data Envelopment Analysis; National Airlines; Low-Cost Carriers

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Trust, Guanxi and Cooperation in Buyer-Supplier Relationships

Pei-Hsuan Tsai^{1*}, Fan-Yun Pai², Yu-Chin Hsiao³

Abstract Most of manufacturing companies are small and medium enterprises. Compared to companies in Western countries, Asian companies need to cooperation with their suppliers to improve operational performance and efficiency and reduces costs. This study aims to investigate relationships among buyers' trust on supplier, buyer-supplier mutual cooperative behaviors and relationship quality. Also, in Chinese culture context, Guanxi plays an important role in interaction between a buyer and its suppliers. Therefore, Guanxi is considered as the moderator. Questionnaires were distributed to samples in hand tool industry in Taichung Taiwan. This study employ partial least square method (PLS) to verify the relationships among variables in conceptual model. This study found that the more the buyer's trust on its supplier, the more cooperative behaviors between the buyer and its supplier. Guanxi enhances the positive relationship between buyer's trust on its supplier and their cooperative behaviors. The more cooperative behaviors between a buyer and its supplier, the higher intention for the buyer to continue relationship with its supplier. Also, the more cooperative behaviors lead to lower relational risk on buyer-supplier relationship.

Keywords: Goodwill Trust, Competence trust, Cooperation, Guanxi, Relationship Quality

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Outpatient Patient Satisfaction Scale Construction for Taiwan Hospitals

Fang-Min Fu^{1*}, Fan-Yun Pai², Yun-Meng Liang³

Abstract With statistics from the Ministry of Health and Welfare in Taiwan, Taiwan hospitals has gradually decreased by 10.4% from 2006 to 2016. With the development of healthcare science and improvement of living standard and education, people are asking for higher living quality and more demand in the country. After the implementation of the National Health Insurance System in Taiwan, more and more people are focus on the healthcare quality. In the previous studies, patient satisfaction has been developing as a main factor to measure service quality, and outpatient department medical service is the window between hospitals and patients. Satisfaction surveys represent not only a hospital's satisfaction for the patient service and medical technology but an index for patients to determine whether they will go back to the same hospitals for outpatient medical service or go back for other services, such as physical examination and surgery service. It is critical for hospitals to develop a scale to measure outpatient satisfaction; however, there are few studies to measure the overall satisfaction. This study aims to develop an outpatient patient satisfaction scale for hospitals. In this study, outpatient patient satisfaction scale was developed based on structure, process, and outcome parts. There are a several factors included in the proposed questionnaire and they are medical environment facility (structure), the service attitude, administrative efficiency, relationship between doctors and patients (process), professional factors and healthcare results (outcome). After constructing the outpatient patient satisfaction scale, questionnaires will be distributed to Taiwan hospitals to verify the factors and items used to measure satisfaction.

Keywords: Patient satisfaction; Outpatient department; Satisfaction scale

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Exploring the Whether Adolescents Perception of Deviance or Non-Deviance When Using the Internet Increases or Decreases Deviant Behavior While Using the Internet

Annie J. Daniel.*

Abstract If the current trend continues, the use of computer technologies and the Internet will increase for teaching and education. It is urgent that researchers study computer and Internet deviance. “Any new technology tends to create a new human environment,” Marshall McLuhan declared this quote over forty years ago. Indeed, today’s technology has created many new human environments and behaviors. Deviant behaviors on the computer and the Internet are rising as technology use increases (Hollinger, 1996b; Power, 2000; Vatis, 2000). This is evident in the enormous number of computer viruses, hacking; data pirating that have recently caused businesses, educational institutions and personal computer users to become skeptical about performing familiar daily tasks (e.g., opening email messages). For the purpose of this study, deviant behavior for technology will include these activities: using computers and the Internet for illegal activities that violate local, state, and/or federal laws, inappropriate use; such as, a violation of the intended use of the Internet or computer, and/or its intended purpose and goal, obscene activities; defined as entering a pornography website or selling pornography goods on the Internet; using the Internet or computer to violate copyrights laws or other contracts such as institutional or third party copyright, license agreements and other contracts, intentionally disrupting the Internet traffic by spreading a computer virus, spreading rumors about another person on the Internet, intimidating, bullying and frightening another person on the Internet. The goal of this study was to explore middle and high school students' perceptions of deviant behavior when using computers and the Internet. The target population for this study was middle and high school students. The accessible population included all students who attended a middle or high school in the East Baton Rouge Parish School, which has computers that are capable of accessing the Internet (1,150 students–575 middle school students and 575 high school students). Professor San-Yi Li of Taiwan designed the instrument used in this study. The instrument contained 66 questions and a scantron was used to record participants' responses. From the instrument, variables were selected from five sections–1) student’s demographic characteristics 2) computer-related activities 3) student’s perceptions of deviant behavior when using computers and the Internet 4) students perception of their peers deviant behavior when using computers and the Internet 5) students ability to use computers and the Internet. Results showed that the majority of students indicated they perceive their behavior as being not deviant when using computers and the Internet. Contrarily, the students indicated they perceive the behavior of their peers to be more deviant when using computers and the Internet. When the means of the Students Behavior Score and the Peers Behavior Score were compared, there was a significant different between the two scores. The Peers Behavior Score for deviance was much higher than the Students Behavior Score.

Keywords: Adolescents, Perception, Decreases

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Small Enterprises and Environmental Sustainability: A Review of Recent Developments

Olamide Oluwaseyi Oguntoye*

Abstract Aim is to examine recent developments in the study of SMEs and environmental sustainability with a view to understanding emerging trends and new research directions. Using a deductive thematic analysis of relevant literature, the paper examines publications from the last decade and compares themes with earlier sets of literature in this field. Three key trends are observed – a changing conceptual view of SMEs, the growing embodiment of theories from adjacent disciplines, and the growing analytical segmentation of SMEs. Based on these findings, potential areas for future research on SMEs and the environment are discussed.

Keywords: SME, Capacity Development, SDG, Environmental Management

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Food safety and vulnerability perceptions of consumers in Taiwan

Tzu-Ya Ho¹, Pao-Hui Lin^{2*}, Hsien-Tang Tsai³

Abstract The ceaseless food scandals that happened in recent years have increased the consumer's risk perceptions of foods and destroyed their trust to food providers. Consumers' perception of food safety is much less satisfaction than expected, consumers are exposed to food safety vulnerability, finally there will be consumer protest, consumer web connection, and consumer boycott behavior. Vulnerability is a broad concept with wide-ranging applicability; however, the issue of food safe vulnerability has not yet been addressed. The study was to identify the attributes of critical food safety vulnerability in Taiwan. A total number of 160 valid survey samples was analyzed by using the analytical methods of Importance-Performance Analysis. It looks at two dimensions of consumer's response to food safety, moreover examines both how well a factor contributes to a given goal as well as how important that factor is to the consumers. By understanding both the importance and performance of a given factor, the managers can discover where they are succeeding and where they need to improve in food safety.

Keywords: Food Safety, Food Safety Vulnerability, Importance-Performance Analysis

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Analysis of Differences in Core Competencies among Major, Grade and Gender of Korean University Students

Lee Kyunghwa^{1*}, Yang Hyejin²

Abstract In order to achieve global competitiveness, university students should have core competency as creative convergent talent that can actively respond to changes, recreate culture with new ideas, and play a leadership role in a constantly diversifying society. Therefore, it is very important to analyze the core competencies of university students according to their major, grade, and gender, and to develop differentiated and systematic curriculum based on this. In this study, a core competency test (by S University, 2016) was conducted on 5770 students in years 1 to 4 at “S University” in Seoul. We analyzed the core competencies of students (creative competence, convergence competence, community competence, communication competence, leadership competence, and global competence) according to their major, grade, and gender. The results showed that there were differences in the 6 core competencies among college students according to their majors($p<.05$): creativity and convergence competence were the highest in Art and the lowest in Law and Sports; communication and leadership competence were the highest in the convergence specialized free majors, and the lowest in Art; the highest communication competence was found in the humanities, and the lowest in convergence specialized free majors; global competence was the highest in the humanities, and lowest in the sports majors; Overall the six core competencies of Soongsil are the highest among those students in the convergence specialization. In addition, there were differences in core competencies among Korean university students according to the year of study students were($p<.05$) in all 6 core competencies ($p<.05$), with the students in the 4th year being the highest in all 6 core competencies including the core competency total. The core competence of students was found to be higher in males than females in all areas of creativity, convergence, global competence and core competence, except communication. Based on these results, universities should develop appropriate curriculum considering majors, grade, and gender in order to effectively cultivate core competencies of students.

Keywords: Core competency, Creative competence, Convergence competency, Community competence, Communication competency, Leadership competence, Global competence

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B Corporations in Taiwan

Juei-Chi Chang^{1*}

Abstract The B Corporations has been regarded as a popular type of company in recent years. This organizational form is considered to better than government because of it is more efficient. Also, it is considered to better than a traditional company because it is more ethical (Rae 2012). So far, there are 21 B corporations in Taiwan. The first one is certified in 2014, most of them are certified in 2016. These corporations win more score from community sector than other sector, which means they have great contribution in their communities. However, most of them gain few points from customer sector which may have further impact on company's revenue. Thought B corporations in Taiwan are expanding their impact in this country, they must have more clear mission and management mechanism to prove the accountability of the benefit system.

Keywords: B Corporations, B Lab

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**TRACK B: ENGINEERING & TECHNOLOGY,
COMPUTER, BASIC & APPLIED SCIENCES**

Electrical properties and electromechanical responses of pullulan hydrogels for soft actuator application

Kochakorn Saeae^{1*}, Anuvat Sirivat²

Abstract Pullulan is one of non-ionic polysaccharides obtained from the fermentation medium of black yeast. Due to its non-toxic, non-mutagenic, non-immunogenic, non-carcinogenic, tasteless, edible, and odorless characteristics, they have been explored for biomedical applications including tissue engineering, targeted drug/gene delivery, and wound healing. In addition, Pullulan is an interesting material to develop a novel polymeric actuator with improved existing actuation performances. In this work, the pullulan was prepared by using sodium trimetaphosphate (STMP) as the crosslinking agent to form hydrogel. The effects of the amounts of crosslinking agent and electric field strengths on the electromechanical properties were investigated. The storage modulus (G') increased with increasing crosslinking agent amount. For the electric field strength effect, the storage modulus decreased at low electric field strength, and it increased at high electric field strength. The storage modulus and loss moduli were transformed to the creep compliance through the relaxation spectrum and retardation spectrum, respectively. The creep compliance of pullulan hydrogel decreased with increasing crosslinking agent amount. In the case of electric field strength, the creep compliance initially increased at low electric field strength and decreased at high electric field strength, suggesting two competing mechanisms were involved.

Keywords: Pullulan Hydrogels, Electromechanical Response, Actuator

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Electrically Controlled Drug Release from Carboxymethyl Cellulose Hydrogel

Kittipon Sangsuriyonk^{1*}, Anuvat Sirivat²

Abstract Transdermal drug delivery is a technique to introduce a drug into body through skin and into blood system with high efficiency, especially in avoiding the first pass effect. Carboxymethyl cellulose is one of water-soluble cellulose derivatives, produced from renewable sources; it is non-toxic, low cost, and pH dependent. Hydrogels based on carboxymethyl cellulose (CMC) were prepared by solution casting method by using citric acid as the crosslinking agent. The carboxymethyl cellulose hydrogel were prepared under various molar ratios of CMC and citric acid namely 0.2, 0.3, 0.4, 0.5, and 0.6. 5-fluorouracil, a non-ionic cancer drug, was released from the hydrogel under electrical potentials. The diffusion coefficients and the release mechanisms of the model drugs on the CMC hydrogels were investigated by using a modified Franz-Diffusion cell with the PBS buffer solution of the pH value of 7.4 at temperature of 37 °C for the duration of 24 h. In this work, the effects of mesh size, electric field strength, and electrode polarity were systematically studied. The swelling test illustrated an increase of the mesh size with decreasing crosslinking agent. In addition, the drug diffusion coefficient decreased with increasing crosslinking ratios. Moreover, the diffusion coefficient clearly depended on the applied electric strength and the electrode polarity.

Keywords: Carboxymethyl cellulose, Controlled drug release, Electrically stimuli

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Fabrication of Graphene Oxide/Hyaluronic Acid Composite Hydrogels for Electrically Controlled Transdermal Drug Delivery System

Ms Nuttawadee Sittisanguanphan^{1*}, Anuvat Sirivat²

Abstract Transdermal drug delivery system (TDDS) is a medicated adhesive patch placed on the skin to deliver drug molecules through the skin and into blood circulation. In this work, the tamoxifen citrate loaded graphene oxide/hyaluronic acid (TMX-loaded GO/HA) composite hydrogels were fabricated by the solution casting method using citric acid as the chemical crosslinking agent at various HA and citric acid mole ratios of 1: 1, 1: 2, and 1: 3. The functional groups, morphology, swelling behaviors, mesh size, and released behaviors of the hydrogels were investigated. The degree of swelling (%), weight loss (%), and mesh size of the HA hydrogels decreased with increasing HA and citric acid mole ratio. In the vitro drug release experiments, the amounts of TMX release from the composite hydrogels relative to the pristine HA hydrogel under the effect of electric potential were investigated using the modified Franz-diffusion cells with the ethanol/phosphate buffered saline solution (pH ~7.4) at 37 °C for the duration of 24 h. The amounts of TMX released from HA hydrogels increased with time and then reached the constant values. With decreasing HA and citric acid mole ratio, the amounts of TMX released increased. Under an applied electric potential, the higher amounts of TMX released were observed when compared to that without an electric potential. In order to increase the amounts of TMX released under applied electric potential, the GO was used. It was found that GO affected the release behavior of TMX-loaded GO/HA composite hydrogels under applied electric potential.

Keywords: Transdermal drug delivery, Hyaluronic acid hydrogels, and Graphene oxide

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Deproteinized natural rubber latex (DPNR) foam for controlled drug release

Kamonpan Ruangmak^{1*}, Anuvat Sirivat²

Abstract Deproteinized natural rubber latex (DPNR) was obtained from natural rubber latex (NRL) in which some proteins that cause the skin allergy were eliminated. It possessed many good properties to be used as the transdermal patch namely biocompatibility, high mechanical resistance, ease of manipulation, and low cost. In this work, the DPNR foams were prepared by the UV irradiation and the surfactant micelle formation to produce various porous structures. Sodium dodecyl sulfate (SDS) was used as the surfactant at various DPNR: SDS volume ratios (1:0.3 to 1:0.5). The fabricated foams were characterized for the surface morphology and pore size. The DPNR foams were prepared with various DPNR: SDS volume ratios, and various pore sizes were obtained. The pore size of DPNR foams increased with increasing DPNR: SDS volume ratio. However, the porosity was not obtained in the dense DPNR film, in which no SDS was added. After that, the modified Franz diffusion cells were used to study the drug releases during a period of 24 hours using the phosphate buffer solution at the pH of 7.4 and at the temperature of 37 ± 0.5 °C. The model drug solution, indomethacin in ethanol, was allowed to be absorbed into the transdermal patch before the release experiment. The drug release experiment field revealed that the model drug was hardly released from the dense DPNR film (5.7 %), whereas, it was released much easier from the DPNR foams (80.8 to 94.5 %) and attained the steady state amounts within the short periods of 3-5 hours.

Keywords: Natural Rubber Latex, Porous Structure, Transdermal Patch, Drug Delivery System

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Electrically Controlled Release of Diclofenac Sodium Salt from Dextran Hydrogel

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Abstract Transdermal drug delivery systems (TDDS) are used as an alternative route to deliver drugs into the blood system for therapy. The materials that have been widely used in TDDS are hydrogels. However, the hydrogel in TDDS has a limitation namely the low amount of drug released. This limitation can be improved by applying external stimulus such as electric field. The dextran hydrogels were prepared by the solution casting using trisodium trimetaphosphate (STMP) as the crosslinking agent, and diclofenac sodium salt as the anionic model drug. The in-vitro release of diclofenac sodium salt from the dextran hydrogels was studied using a modified Franz-Diffusion cell in a phosphate-buffered saline (PBS) solution at the pH of 7.4 and at 37 °C for a period of 24 h, in order to investigate the effects of the dextran molecular weights, crosslinking mole ratios, and electrical potentials. The drug-loaded dextran hydrogels were obtained from various dextran molecular weights (40000 and 500000 g/mol) with the dextran: STMP mole ratios from 1:0.2 to 1:1. The swelling and mesh size decreased with increasing crosslinking mole ratio. For the release behavior of diclofenac sodium salt loaded in the dextran hydrogel, the amounts and release rates decrease with increasing dextran: STMP mole ratios, but were greater under applied electrical potentials relative to without electrical potential. Thus, the applied electrical potential was shown to enhance the amounts and release rates of diclofenac sodium salt from the dextran hydrogel.

Keywords: Dextran Hydrogel, Diclofenac Sodium Salt, Electrically Controlled Release

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