ICMMA2018

The 12th International Conference

On Multi-functional Materials and Applications

November 22-25, 2018

仁荷大學校

CDAMC

Organized by

Center for Design and Applications of Molecular Catalysts
Inha University, Incheon, Korea

Supported by

Creative Korea-II: Center for Future-Leading Chemistry Undergraduate Education
Department of Chemistry and Chemical Engineering
Chemistry Molecular Dynamic Research Center
College of Natural Sciences, Inha University

Co-organizers

Hanseo Univ.
Hefei Univ.
Anhui Univ. Sci. Technol.
Journal of Multifunctional Materials & Photoscience
Anhui Univ. Technol.
Anhui Jianzhu Univ.
Anhui Univ.
Suzhou Univ. Sci. Technol.
Yancheng Institute. Technol.

ICMMA 2018 PROGRAM

November 22 - 25, 2018 INHA University, Incheon, Korea

Thursday November 22, 2018

12:00-18:00	Onsite Registration
18:00-20:00	Welcome Reception
20:00~	Conference Committee Board Meeting (for ICMMA2019)

Friday November 23, 2018

08:30~	Onsite Registration
08:50-10:00	Opening Ceremony (Inha University, Korea)
Session I (Room A) (10:00-11:00) (Session Chairman: Prof. Dr. Won-Chun Oh)	
10:00-10:30	PL-1 Catalysis for Value-Added Chemicals by using CO_2 as Oxygen Source by Prof. Sang-Eon Park
10:30-11:00	PL-2 Efficient Graphitization of Carbons Using Microwaves by Prof. Shin R. Mukai
11:00-11:10	**Coffee Break**
Session II-1 (Room A) (11:10-12:30) (Session Chairman: Prof. Dr. Shin-ichi Kondo)	
11:10-11:30	IL-1 Transition Metal Oxide/Carbon Material Nanocomposites As Electrocatalytic Materials for All-Vanadium Redox Flow Batteries by Prof. Chen-Hao Wang
11:30-11:50	IL-2 Structural Aspect and Functional Properties of Mixed-Ligand Coordination Polymers by Prof. Jaursup Boonmak
11:50-12:10	IL-3 Silsesquioxanes-based Nanoporous Materials for Water Remediation by Prof. Hongzhi Liu
12:10-12:30	IL-4 Hybrid materials of POSS grafted polybenzimidazole by Prof. Qingzeng Zhu
Session II-2 (Room B) (11:10-12:30) (Session Chairman: Prof. Dr. Shin R. Mukai)	
11:10-11:30	IL-5 Graphene based ferrites composites as a promising anode materials by Prof. Kefayat Ullah
11:30-11:50	IL-6 Solution-derived high-k gate dielectric for low-voltage-operated thin film transistor and inverters by Prof. Gang He
11:50-12:10	IL-7 The hydrogen storage properties of porous framework materials by Prof. Jin Liu
12:10-12:30	IL-8 The sintering behavior of bulk SiC/C body derived from high-molecular weight poly(carbosilane) by Dr. Yoonjoo Lee
12:30-13:30	**Lunch**
Session III (Room A) (13:30-14:30) (Session Chairman: Prof. Dr. Seung Kyu Park)	
13:30-14:00	PL-3 Fluorescence Functional Materials Based on Dipyrenylsilyl Groups by Prof. Shin-ichi Kondo
14:00-14:30	PL-4 Secondary Resources to Sustainable Resources Innovations Resource Recovery from Spent SCR Catalyst: Hydrometallurgy Role in Metal Recovery Processing by Dr. R. Kumar Jyothi
Poster Session (14:30-15:30) (Session Chairman: Prof. Dr. Chuyang Xu) with Coffee and Beverage	
Session IV-1, V-1, VI-1 (Room A) (15:30-18:15)	
15:30-18:15	Oral Lectures (OL 1~4, OL 8~10, OL 14~16)
Session IV-2, V-2, VI-2 (Room B) (15:30-18:15)	
15:30-15:50	IL-9 Constructed CdTe QDs surface Fluorescence Probe towards Detection of Ultraterace Paraquat Pesticide Residues Based on FRET Mechanism
15:50-18:15	Oral Lectures (OL 5~7, OL 11~13, OL 17~19)
18:30-20:30	**Banquet**
20:20-20:30	Closing Remark (Prof. Dr. Zhaoqi Sun)

Saturday November 24, 2018

9:30 -12:00	Conference Tour
13:00~	Free tour

ICMMA 2018 PROGRAM

November 22 - 25, 2018 INHA University, Incheon, Korea

Plenary Lectures

PL-1	Catalysis for Value-Added Chemicals by using CO_2 as Oxygen Source	**Sang-Eon Park**
PL-2	Efficient Graphitization of Carbons Using Microwaves	**Shin R. Mukai**
PL-3	Fluorescence Functional Materials Based on Dipyrenylsilyl Groups Secondary Resources to Sustainable Resources Innovations Resource	**Shin-ichi Kondo**
PL-4	Recovery from Spent SCR Catalyst: Hydrometallurgy Role in Metal Recovery Processing	**Rajesh Kumar Jyothi**

Invited Lectures

IL-1	Transition Metal Oxide/Carbon Material Nanocomposites As Electrocatalytic Materials for All-Vanadium Redox Flow Batteries	**Chen-Hao Wang**
IL-2	Structural aspect and Functional Properties of Mixed-Ligand Coordination Polymers	**Jaursup Boonmak**
IL-3	Silsesquioxanes-Based Nanoporous Materials for Water Remediation	**Hongzhi Liu**
IL-4	Hybrid materials of POSS grafted polybenzimidazole	**Qingzeng Zhu**
IL-5	Graphene based ferrites composites as a promising anode materials	**Kefayat Ullah**
IL-6	Solution-derived high-k gate dielectric for low-voltage-operated thin film transistor and inverters	**Gang He**
IL-7	The hydrogen storage properties of porous framework materials	**Jin Liu**
IL-8	The sintering behavior of bulk SiC/C body derived from high-molecular weight poly(carbosilane)	**Yoonjoo Lee**
IL-9	Constructed CdTe QDs surface Fluorescence Probe towards Detection of Ultratrace Paraquat Pesticide Residues Based on FRET Mechanism	**Daming Gao**

ICMMA 2018 PROGRAM

November 22 - 25, 2018 INHA University, Incheon, Korea

Oral Lectures

OL-1	Effective removal of Cr(VI) ions from aqueous solution by cellulose and zinc impregnated cellulose composites	**Kongsak Pattarith**
OL-2	Transition metal doped nanostructrured ZnO semiconductor: An efficient reusable as heterogeneous catalyst for the synthesis of Knoevenagel-Doebner and Biginelli reaction	**Kaluram G. Kanade**
OL-3	GSH-doped GQDs using citric acid rich-lime oil extract for highly selective and sensitive determination and discrimination of Fe^{3+} and Fe^{2+} in the presence of H_2O_2 by a fluorescence "turnoff" sensor	**Saksit Chanthai**
OL-4	Thermal and flammability performance of polymeric nanocomposites with zirconium phosphate and carbon nanotubes	**Hongdian Lu**
OL-5	Binder-free formation of $Ag@Ni(OH)_2$ over graphene/Ni foam and glucose sensing	**Jong-Sung Yu**
OL-6	Photocatalytic performance of ZnO-Rhizophora mucronata biochar catalyst for methylene blue degradation	**Prawit Nuengmatcha**
OL-7	High Triplet Charge Transport Materials for Blue Phosphorescence Organic Light Emitting Devices	**Kyung-Ryang Wee**
OL-8	Hydrothermal preparation of hierarchical ZIF-L nanostructures for enhanced CO2 capture	**Xianbiao Wang**
OL-9	Preparation of Fullerene-BODIPY Dyad as Heavy Atom Free Singlet Oxygen Generator	**San-E Zhu**
OL-10	Comparison of the effectiveness of fingerprint powders in forensic science	**Rachadaporn Benchawattananon**
OL-11	Study on Gemstones identification for crime investigators	**Siree Saengthong**
OL-12	Quantum Dot Photosensitizers for Solar Energy Conversion	**Jae-Yup Kim**
OL-13	Thiol-functionalized graphene oxide/iron oxide nanocomposite as a magnetic sorbent based on ultrasound-assisted dispersive solid-phase microextraction for heavy metals analysis	**Nattida Lamaiphan**
OL-14	Thermal-degradation behavior of Si-Zr-C-O Fiber Felt Fabricated by Electrospinning	**Young-Jun Joo**

ICMMA 2018 PROGRAM

November 22 - 25, 2018 INHA University, Incheon, Korea

Oral Lectures

OL-15	Synergistic enhancement of flame retardant and mechanical properties of multi-walled carbon nanotube and expandable graphite reinforced polymer composites	**Doojin Lee**
OL-16	In-vitro antioxidant activity of the crude extract of Chromolaena odata (L.) King and Robinson	**Arnannit Kuyyogsuy**
OL-17	Facile Fabrication of Ag/Graphene Oxide/TiO_2 Films for Recyclable Surface Enhanced Raman Scattering (SERS)	**Yanfen Wang**
OL-18	Coated Ceramic with Boron Nitride by Self-assembly and Atomic Conversion	**Woo-Seong Tak**
OL-19	Toxic nano-materials and ions detection using DNA modified micro-resonator	**Kuewhan Jang**

Poster Presentation

Friday November 23, 2018

Conference Chairman:

Prof. Chan Kyung Kim

(Department of Chemistry, Inha University, Korea)

Conference Vice Chairman:

Prof. Jin Liu (Anhui Jianzhu University, China)

Prof. Won-Chun Oh (Hanseo University, Korea)

Prof. Wan In Lee (Inha University, Korea)

Prof. Hun Yeong Koh (Inha University, Korea)

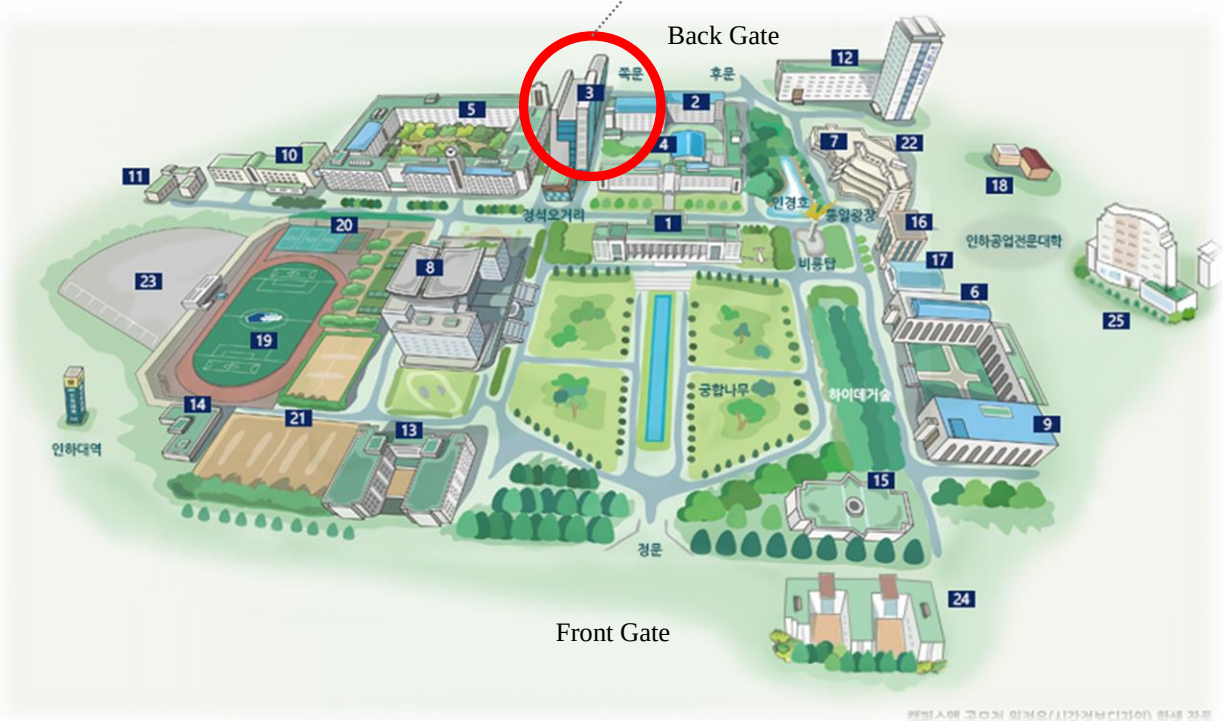
ICMMA 2018 MAP

November 22 - 25, 2018 INHA University, Incheon, Korea

Venue: 60th Anniversary Hall

Room A: Lecture Room 107

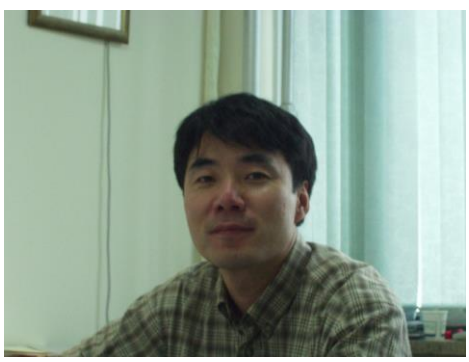
Room B: Lecture Room 106



Secretary General:

Prof. Keun-Hyeung Lee

(Inha University, Korea)



The 12th International Conference on Multi-functional Materials and Applications (ICMMA 2018)

Conference Chairman:

Prof. Chan Kyung Kim (Department of Chemistry, Inha University, Korea)

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Prof. Jin Liu (Anhui Jianzhu University, China)

Prof. Won-Chun Oh (Hanseo University, Korea)

Prof. Wan In Lee (Inha University, Korea)

Prof. Hun Yeong Koh (Inha University, Korea)

Secretary General:

Prof. Keun-Hyeung Lee (Inha University, Korea)

Conference Local Chairman:

Prof. Won-Chun Oh (Hanseo University, Korea)

Prof. Jin Liu (Anhui Jianzhu University, China)

Prof. Mingxu Zhang (Anhui University of Science & Technology, China)

Prof. Cheol Gyu Kim (Hanbat National University, Korea)

Prof. Zhigang Chen (Suzhou University of Science and Technology, China)

Prof. Ding Ming (Bengbu University, China)

Prof. Shin Mukai (Hokkaido University, Japan)

Dr. Chong-Hun Jung (Korea Atomic Energy Research Institute, Korea)

Prof. Masahiro Toyoda (Oita University, Japan)

Prof. Zhaoqi Sun (Anhui University, China)

Prof. Chuyang Xu (Anhui University of Science & Technology, China)

Prof. Heon-Chang Kim (Hoseo University, Korea)

Prof. Saksit Chanthai (Khon Kaen University, Thailand)

Prof. Chen-Hao Wang (National Taiwan University of Science and Technology, Taiwan)

Prof. Bao-Lin Wang (Nanjing Normal University, China)

Prof. Dasung Sun (Hefei Normal University, China)

Prof. Ram Agarwal (AJC Editor Chief, India)

Prof. Luming Wang (Yancheng Institute of Technology, China)

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Prof. Jae-Won Lee (Dankook University, Korea)

Prof. Yin Liu (Anhui University of Science and Technology, China)

Prof. Cheol-Kyu Jun (Hoseo University, Korea)

Prof. Lei Zhu (Yancheng Institute of Technology, China)

Dr. Taegyu Lee (Daelim Engineering Construction Co.,Ltd, Korea)

Prof. Prawit Nuengmatcha (Nakhon Si Thammarat Rajabhat University, Thailand)

Prof. Goutam Mukhopadhyay (B.C.D.A College of Pharmacy &Technology, India)

Prof. Zainal Arifin Ahmad (University Sains, Malaysia)

Prof. WeiChang Hao (BeiHang University, China)

Prof. Chunhu Wang (Bengbu University, China)

Prof. Jingbiao Cui (University of Memphis, USA)

Conference Academic Chairman:

Prof. Chan Kyung Kim (Department of Chemistry, Inha University, Korea)

Prof. Won-Chun Oh (Hanseo University, Korea)

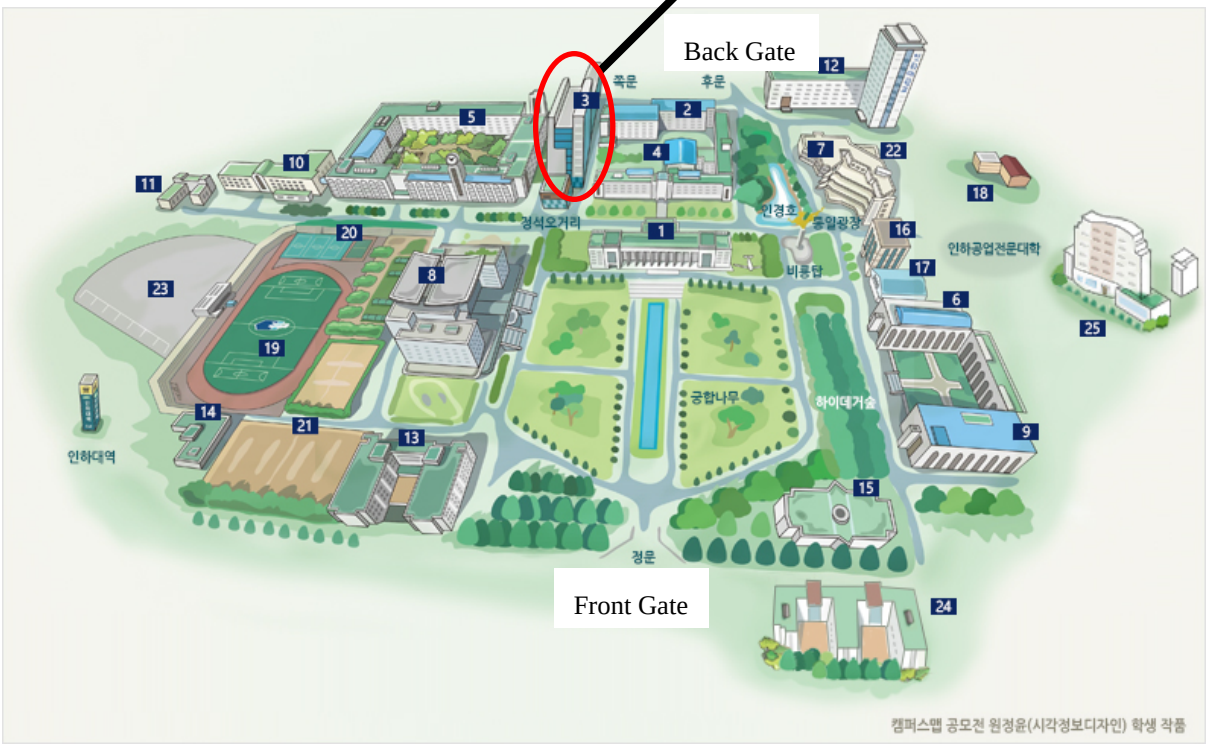
Prof. Jin Liu (Anhui Jianzhu University, China)

Prof. Wan In Lee (Inha University, Korea)

Venue: 60th Anniversary Hall

Room A: Lecture Room 107

Room B: Lecture Room 106



Agenda of ICMMA2018 - Opening Ceremony

(Host by Prof. Dr. **Chan Kyung Kim**)

60th Anniversary Hall (Room 107)

<table>
<tr><td>08:50-09:00</td><td colspan="2">Report address by Prof. Chan Kyung Kim (Inha University, Korea)
– Conference Chairman</td></tr>
<tr><td rowspan="3">09:00-09:30</td><td>09:00-09:10</td><td>Opening Address by
Prof. Dr. Soobong Shin (Inha University, Korea)
The Vice President of Inha University, Korea
Prof. Dr. Kyungnam Han
Dean, College of the Natural Sciences</td></tr>
<tr><td>09:10-09:20</td><td>Address by
Prof. Dr. Won-Chun Oh
(Hanseo University, Korea) – Conference Vice Chairman
Introduction of Potential Scientists</td></tr>
<tr><td>09:20-09:30</td><td>Address by Prof. Dr. Chen-Hao Wang
(National Taiwan University of Science and Technology, Taiwan)
Introduction of ICMMA 2019</td></tr>
<tr><td>09:30-09:40</td><td colspan="2">"Award of Appreciation Plaque"
Plaque to Prof. Dr. Dasung Sun
(Hefei Normal University, China)</td></tr>
<tr><td>09:40</td><td colspan="2">The conference chairman announces ICMMA 2018 begins</td></tr>
<tr><td>09:50</td><td colspan="2">Group Photo</td></tr>
</table>

Conference Program

November 22 (Thursday), 2018

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20:00~	Conference Committee Board Meeting (for ICMMA2019)

November 23 (Friday), 2018

08:30~	Onsite Registration
08:50-10:00	Opening Ceremony (Inha University, Korea)
Session I (Room A: 107) (10:00-11:00) (Session Chairman : Prof. Dr. Won-Chun Oh)	
10:00-10:30	**Plenary Lecture 1** Prof. **Sang-Eon Park** (Department of Chemistry, Inha University, Korea) ***Catalysis for Value-Added Chemicals by using CO_2 as Oxygen Source***
10:30-11:00	**Plenary Lecture 2** Prof. **Shin R. Mukai** (Division of Applied Chemistry, Faculty of Engineering, Hokkaido University, Japan) ***Efficient Graphitization of Carbons Using Microwaves***
11:00-11:10 Coffee Break	
Session II-1 (Room A: 107) (11:10-12:30) (Session Chairman : Prof. Dr. Shin-ichi Kondo)	
11:10-11:30	**Invited Lecture 1** Prof. **Chen-Hao Wang** (Department of Materials Science and Engineering, National Taiwan University of Science and Technology, Taiwan) ***Transition Metal Oxide/Carbon Material Nanocomposites As Electrocatalytic Materials for All-Vanadium Redox Flow Batteries***
11:30-11:50	**Invited Lecture 2** Assoc.Prof. **Jaursup Boonmak**, **(**Department of Chemistry and Center of Excellence for Innovation in Chemistry, Khon Kaen University, Thailand) ***Structural aspect and Functional Properties of Mixed-Ligand Coordination Polymers***
11:50-12:10	**Invited Lecture 3** Prof. **Hongzhi Liu** (College of Chemistry and Chemical Engineering, Shandong University, China.) ***Silsesquioxanes-Based Nanoporous Materials for Water Remediation***

12:10-12:30	**Invited Lecture 4** Prof. **Qingzeng Zhu** (Ministry of Education School of Chemistry and Chemical Engineering, Shandong University, China) ***Hybrid materials of POSS grafted polybenzimidazole***
Session II-2 (Room B: 106) (11:10-12:30) (Session Chairman : Prof. Dr. Shin R. Mukai)	
11:10-11:30	**Invited Lecture 5** Prof. **Kefayat Ullah (**Department of Applied Physical & Material Sciences, University of Swat, Pakistan) ***Graphene based ferrites composites as a promising anode materials***
11:30-11:50	**Invited Lecture 6** Prof. **Gang He** (Radiation Detection Materials & Devices Lab, Anhui University, China) ***Solution-derived high-k gate dielectric for low-voltage-operated thin film transistor and inverters***
11:50-12:10	**Invited Lecture 7** Prof. **Jin Liu** (Anhui Key Laboratory of Advanced Building Materials, Anhui Jianzhu University, China) ***The hydrogen storage properties of porous framework materials***
12:10-12:30	**Invited Lecture 8** Dr. **Yoonjoo Lee** (Energy & Environmental Division, Korea Institute Ceramic Engineering & Technology, Korea) ***The sintering behavior of bulk SiC/C body derived from high-molecular weight poly(carbosilane)***
12:30-13:30 Lunch Time	
Session III (Room A: 107) (13:30-14:30) (Session Chairman : Prof. Dr. Seung Kyu Park)	
13:30-14:00	**Plenary Lecture 3** Prof. **Shin-ichi Kondo (**Faculty of Science, Yamagata University, Japan) ***Fluorescence Functional Materials Based on Dipyrenylsilyl Groups***
14:00-14:30	**Plenary Lecture 4** Prof. **Rajesh Kumar Jyothi (**Korea Institute of Geoscience & Mineral Resources (KIGAM), Korea) ***Secondary Resources to Sustainable Resources Innovations Resource Recovery from Spent SCR Catalyst: Hydrometallurgy Role in Metal Recovery Processing***

Poster Session (14:30-15:30) (Session Chairman : Prof. Dr. Chuyang Xu) with Coffee and Beverage	
Session IV-1 (Room A: 107) (15:30-16:35) (Session Chairman : Prof. Dr. Hui Zhang)	
15:30-15:50	**Oral Lecture 1** Prof. **Kongsak Pattarith** (Department of Chemistry, Buriram Rajabhat University, Thailand) ***Effective removal of Cr(VI) ions from aqueous solution by cellulose and zinc impregnated cellulose composites***
15:50-16:05	**Oral Lecture 2** Prof. **Kaluram G. Kanade** (P. G. and Research Centre, Yashavantrao Chavhan Institute of Science, India) ***Transition metal doped nanostructrured ZnO semiconductor: An efficient reusable as heterogeneous catalyst for the synthesis of Knoevenagel-Doebner and Biginelli reaction***
16:05-16:20	**Oral Lecture 3** Prof. **Saksit Chanthai** (Department of Chemistry, Khon Kaen University, Thailand) ***GSH-doped GQDs using citric acid rich-lime oil extract for highly selective and sensitive determination and discrimination of Fe^{3+} and Fe^{2+} in the presence of H_2O_2 by a fluorescence "turnoff" sensor***
16:20-16:35	**Oral Lecture 4** Prof. **Hongdian Lu** (Department of Chemical and Materials Engineering, Hefei University, Hefei, Anhui, 230601, P. R. China) ***Thermal and flammability performance of polymeric nanocomposites with zirconium phosphate and carbon nanotubes***
Session IV-2 (Room B: 106) (15:30-16:35) (Session Chairman : Prof. Dr. Hongzhi Liu)	
15:30-15:50	**Invited Lecture 9** Prof. **Daming Gao** (Department of Chemistry and Materials Engineering, Hefei University, China) ***Constructed CdTe QDs surface Fluorescence Probe towards Detection of Ultratrace Paraquat Pesticide Residues Based on FRET Mechanism***
15:50-16:05	**Oral Lecture 5** Prof. **Jong-Sung Yu** (Department of Energy Science and Engineering, Korea) ***Binder-free formation of $Ag@Ni(OH)_2$ over graphene/Ni foam and glucose sensing***

16:05-16:20	**Oral Lecture 6** Prof. **Prawit Nuengmatcha** (Department of Chemistry, Nakhon Si Thammarat Rajabhat University, Thailand) ***Photocatalytic performance of ZnO-Rhizophora mucronata biochar catalyst for methylene blue degradation***
16:20-16:35	**Oral Lecture 7** Prof. **Kyung-Ryang Wee** (Department of Chemistry, Daegu University, Gyeongsan 38453, Republic of Korea) ***High Triplet Charge Transport Materials for Blue Phosphorescence Organic Light Emitting Devices***
16:35-16:45 Coffee Break	
Session V-1 (**Room A: 107) (16:45-17:30) (Session Chairman: Prof. Dr. Qingzeng Zhu)**	
16:45-17:00	**Oral Lecture 8** Prof. **Xianbiao Wang** (School of Materials and Chemical Engineering, Anhui Jianzhu Univeristy, China) ***Hydrothermal preparation of hierarchical ZIF-L nanostructures for enhanced CO_2 capture***
17:00-17:15	**Oral Lecture 9** Prof. **San-E Zhu** (Department of Chemistry and Materials Engineering, Hefei University, China) ***Preparation of Fullerene-BODIPY Dyad as Heavy Atom Free Singlet Oxygen Generator***
17:15-17:30	**Oral Lecture 10** Prof. **Rachadaporn Benchawattananon** (Integrated & Forensic Science, Khon Kaen University, Thailand) ***Comparison of the effectiveness of fingerprint powders in forensic science***
Session V-2 (Room B: 106) (16:45-17:30) (Session Chairman : Dr. Saksit Chanthai)	
16:45-17:00	**Oral Lecture 11** Prof. **Siree Saengthong** (Graduated student in Forensic Science, Khon Kaen University, Thailand) ***Study on Gemstones identification for crime investigators***
17:00-17:15	**Oral Lecture 12** Prof. **Jae-Yup Kim** (Division of Chemical Engineering, Hoseo University, Asan

	336-795, Republic of Korea) ***Quantum Dot Photosensitizers for Solar Energy Conversion***
17:15-17:30	**Oral Lecture 13** Miss. **Nattida Lamaiphan** (Department of Chemistry, Khon Kaen University, Thailand) ***Thiol-functionalized graphene oxide/iron oxide nanocomposite as a magnetic sorbent based on ultrasound-assisted dispersive solid-phase microextraction for heavy metals analysis***
Session VI-1 (Room A: 107) (17:30-18:15) (Session Chairman : Prof. Dr. Gang He)	
17:30-17:45	**Oral Lecture 14** Mr. **Young-Jun Joo (**Ceramic Fiber and Composite Materials Center, Korea Institute of Ceramic Engineering and Technology, Korea) ***Thermal-degradation behavior of Si-Zr-C-O Fiber Felt Fabricated by Electrospinning***
17:45-18:00	**Oral Lecture 15** Dr. **Doojin Lee (**Ceramic Fiber and Composite Materials Center, Korea Institute of Ceramic Engineering and Technology, Korea) ***Synergistic enhancement of flame retardant and mechanical properties of multi-walled carbon nanotube and expandable graphite reinforced polymer composites***
18:00-18:15	**Oral Lecture 16** Dr. **Arnannit Kuyyogsuy** (Department of Chemistry, Nakhon Si Thammarat Rajabhat University, Thailand) ***In-vitro antioxidant activity of the crude extract of Chromolaena odata (L.) King and Robinson***
Session VI-2 (Room B: 106) (17:30-18:15) (Session Chairman : Prof. Dr. Feng-Jun Zhang)	
17:30-17:45	**Oral Lecture 17** Prof. **Yanfen Wang** (School of Physics & Materials Science, Anhui University, China) ***Facile Fabrication of Ag/Graphene Oxide/TiO_2 Films for Recyclable Surface Enhanced Raman Scattering (SERS)***
17:45-18:00	**Oral Lecture 18** Mr. **Woo-Seong Tak (**Ceramic Fiber and Composite Materials Center, Korea Institute of Ceramic Engineering and Technology, Korea) ***Coated Ceramic with Boron Nitride by Self-assembly and Atomic Conversion***
18:00-18:15	**Oral Lecture 19** Prof. **Kuewhan Jang** (School of Mechanical Engineering, Hoseo University, Asan 31499,

	Republic of Korea) ***Toxic nano-materials and ions detection using DNA modified micro-resonator***
Banquet (18:30 ~ 20:30) **Inha University Faculty Restaurant**	
20:20-20:30	Closing Remark **(Prof. Dr. Zhaoqi Sun)**

November 24 (Saturday), 2018

9:30-12:00	Conference Tour
13:00~	Free tour

November 25 (Sunday), 2018

Depature

Presentation Guide

Plenary Lectures

Invited Lectures

Oral Lectures

Posters

In-vitro antioxidant activity of the crude extract of Chromolaena odata (L.) King and Robinson

Arnannit Kuyyogsuy[*1], Paweena Porrawatkul[1] and Sumalee Liumthong[2]

Department of Chemistry, Faculty of Science and Technology

Nakhon Si Thammarat Rajabhat University, Nakhon Si Thammarat 80280, Thailand

**Email:* arnannit.k@gmail.com

Abstract: *Chromolaena odorata* (L.) King and Robinson is used as medicine herb because fresh leaves have been used for the treatment of burn wounds, soft tissue wound and skin infection. Moreover, *C. odorata* can antifungal and antibacterial properties. The study aims to investigate the quantification of total phenolic content and *in-vitro* antioxidant activity of the ethanol extracts of *C. odorata*. The total phenolic content (TPC) and antioxidant capacity in different time point of ethanolic extract (leaf) from *C. odorata* were determined. The leaf samples were extracted using 95% ethanol, while Folin-Ciocalteu assay was employed to determine total phenolic content. Antioxidant activities were assayed by DPPH assay and ferric reducing antioxidant power (FRAP). The results exhibited that the *C. odorata* leaf contained the TPC, which was 17.16±0.20 mg GAE/g crude extract. For antioxidant activity, the *C. odorata* leaf possessed the highest inhibited DPPH (IC_{50} = 60.15±0.50 mg/L) and the FRAP values (24.46±0.20 mg TE/g extract). Phenolic compounds in *C. odorata* leaf have revealed a correlation with antioxidant capacity.

Keywords: *Chromolaena odorata* (L.) King and Robinson, Antioxidant activity, DPPH assay, FRAP assay, Total phenolic content

Introduction

Free radicals are thought to play an important role in many diseases such as chronic and degenerative disease, including diabetes, aging, inflammation and cancer. Our body produces free radicals as byproducts of burning fuel for energy within the cells. Although oxygen is essential for aerobic forms of life, oxygen metabolites are highly toxic. Various environmental exposures such as pollution, smoke, the sun's ultraviolet light and radiation generate free radicals [1]. Therefore, Antioxidants from natural sources act an important role

in helping endogenous antioxidants to neutralize oxidative stress. *Chromolaena odorata* (L.) King and Robinson is a very common native plant in Thailand, particularly, Nakhon Si Thammarat province. *C. odorata* is used as medicine herb because fresh leaves have been used for the treatment of burn wounds, soft tissue wound and skin infection [2]. Moreover, *C. odorata* can antifungal and antibacterial properties [3]. In this study, we investigated the leaf extract of *C. odorata* for antioxidant activity in samples from Tha Ngio, Mueang Nakhon Si Thammarat district, Nakhon Si Thammarat province.

Experimental

Chemicals

The organic solvents were used in the experiments for analytical grade and purchased from Merck, Thailand.

Plant sample

Leave samples of *Chromolaena odata* were collected from Tha Ngio, Mueang Nakhon Si Thammarat district, Nakhon Si Thammarat province.

Extraction procedure

Leave samples of *C. odata* were washed several times with tap water and finally with distilled water to remove dust, then the samples were cut into small pieces and were dried at 60 °C for 60 min. Sample extracts were prepared by adding 20 g of the sample into 150 mL of 95% ethanol in beaker at a room temperature and extracted at 6, 24 and 48 h. The extracts obtained were filtered through Whatman filter paper No.1 and then evaporated to dryness by using a rotary evaporator. The crude extracts were stored at 4$\pm$ 2 °C further used.

Phytochemical analysis

Qualitative phytochemical tests for the identification of anthraquinones, terpenoids, flavonoids, saponins, tannins, alkaloids, coumarin and steroids were carried out for the leaf extract.

Quantification of the total phenolic contents

The concentration of the phenolics in the leave extracts was determined with the Folin Ciocalteau assay [4] and using gallic acid as a standard. The 0.1 mL of extracts and 0.3 mL of Folin Ciocalteau's reagent was added and then shaken. After 5 min, 2.0 mL of 20% Na_2CO_3 was added the mixture. The final volume was brought up to 3.0 mL by adding distilled water

and then mixed. After 90 min of incubation in darkness at room temperature, then the absorbance was measured at 765 nm (UV-VIS). The results were presented as the gallic acid equivalent per grams of crude extract (mg GAE/ g crude extract).

DPPH radical scavenging activity

The ability of the sago latex extracted to scavenge DPPH free radical was assayed by using the standard method [5]. Aliquots of various concentrations (6.25-100 mg/L) of the extract samples were determined with an ethanolic solution having a final DPPH radical concentration of 2.5 mM. After an incubation of 30 min in darkness at room temperature. The absorbance at 518 nm was measured against a blank of pure 95% ethanol. Ascrobic acid was used as the standard compound. The percentage of DPPH inhibition was calculated from the following equation:

$$\% \text{ DPPH Inhibition} = (A_c - A_s)/ A_c \times 100$$

Where as A_c and A_s are the absorbance of control and the sample, respectively.

FRAP assay

Ferric reducing antioxidant power (FAPR) was measured in sample extracts according to Benzie and Strain (1999) [6]. This method is based on the ability of the sample to reduce Fe^{3+} to Fe^{2+} ions. In the presence of TPTZ (2, 4, 6-tripyridyl-*s*-triazine), the Fe^{2+}-TPTZ complex shows blue color which is read at 593 nm. Briefly, 3.0 ml of working FRAP reagent was added to appropriate concentration of the sample extract in acetate buffer. After incubation for 10 min at a room temperature, the absorbance was determined at 593 nm against $FeSO_4$ as a standard.

Results and Discussion

Phytochemical Analysis of leaf extract

Phytochemical analysis of the leaf extracts of *C. odata* showed the presence of different types of compounds. The results showed that the leaf extracts had the main ones being flavonoids, tannins, alkaloids, coumarin and steroids while anthraquinones, terpenoids and saponins absented (Table 1)

Table 1 The presence of different types of compounds by phytochemical analysis

phytochemical compounds	Presence
anthraquinones	-
terpenoids	-
flavonoids	+
saponins	-
tannins	+
alkaloids	+
coumarin	+
steroids	+

present +, absent -

In-vitro Antioxidant activity

Leaf samples were extracted with 95% of aqueous ethanol at different time point. This solvent is highly polar and non-toxic [7]. The antioxidant activity of the leaf extract was determined using DPPH scavenging and FRAP assay. The results showed that the highest antioxidant activity with the IC_{50} value of 60.15 mg/L at 24 h. Moreover, FRAP analysis presented that the leaf extract had the greatest reducing, showing a value of 24.46 mg/g crude extract at the same time (Table 2). The antioxidant property is highly relied on their redox properties and chemical structure (the number and position of hydroxyl group) [8]. For determination of total phenolic content, the results showed that the leaf extract contained the highest amount of total phenolic content was 17.16 mg GAE/g crude extract at 24 h (Table 2). Phenolic compounds are secondary metabolites which act as antioxidants [9] and they are found to be useful, such as an antimicrobial agent [10].

Conclusion

In summary, our finding suggested that the ethanol extract of *C. odata* leaf showed the highest phenolic compounds and a good antioxidant activity at 24 h.

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Table 2 Antioxidant components and capacities at different times

Time (h)	Antioxidant activity		Total Phenolic content
	DPPH assay	FRAP assay	TPC
	IC_{50} (mg/L)	(mg TE/g crude extract)	(mg GAE/g crude extract)
6	66.28±1.10	0.91±0.50	13.93±0.50
24	60.15±0.50	24.46±0.20	17.16±0.20
48	274.22±1.50	19.00±1.50	15.67±0.50

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