The 19th International Student Conference On Advanced Science and Technology (ICAST) 2024 Taipei

November 26 – 27, 2024

Organized by

Graduate School of Science and Technology (GSST), Kumamoto University, Japan

National Taiwan Normal University (NTNU), Taiwan

Research Session:

1. **Physics**
2. **Chemistry**
3. **Earth and Environments**
4. **Biological Sciences**
5. **Applied Chemistry**
6. **Materials Science and Engineering**
7. **Mechanical System Engineering**
8. **Applied Mathematics**
9. **Computer Science**
10. **Electrical Engineering**
11. **Civil and Environmental Engineering**
12. **Architecture**
13. **Multidisciplinary**

General Session:

Undergraduate students and high school students will present their projects related to topics on SDGs in the fields of science and engineering. Oral sessions only.

SCHEDULE 19th ICAST 2024

Day 1, Tuesday 26 November, 2024				
Time (TST)				
9:30-11:30	Opening Session A: Auditorium			
	Lunch			
	Session 1			
	A	B	C	D
14:00	11-1	7-1	5-1	2-1
14:15	11-2	7-2	5-2	2-2
14:30	11-3	7-3	5-3	2-3
14:45	11-4	7-4	5-4	2-4
15:00-15:15	Coffee break			
15:15	11-5	8-1	5-5	2-5
15:30	11-6	8-2	5-6	2-6
15:45	11-7	8-3	14-1	2-7
16:00	11-8	8-4	14-2	9-1
16:30-17:30	Cultural Exchange			

Day 2, Wednesday 27 Novemver, 2024				
Time (TST)	Session 2			
	A	B	C	D
9:30	11-9	3-1	10-1	G-1
9:45	11-10	3-2	10-2	G-2
10:00	11-11	3-3	10-3	G-3
10:15	11-12	3-4	10-4	G-4
10:30-10:45	Coffee break			
10:45	11-13	6-1	10-5	G-5
11:00	11-14	6-2	10-6	G-6
11:15	11-15	6-3	10-7	G-7
11:30	11-16	6-4	10-8	G-8
	Lunch			
	Session 3			
	A	B	C	D
14:00	11-17	3-5		4-2
14:15	11-18	3-6		4-1
14:30	11-19	3-7		4-3
14:45	11-20	3-8		4-4
15:00-15:15	Coffee break			
15:15	11-21	3-9		4-5
15:30	7-5	6-5		13-1
15:45	7-6	12-1		13-2
16:30-17:00	Closing Ceremony A: Auditorium			

Venue: School of Continuing Education, NTNU

Room A: Auditorium, 1st floor

Room B: Lecture hall 306, 3rd floor

Room C: Lecture hall 308, 3rd floor

Room D: Lecture hall 309, 3rd floor

Online Session on Dec 9 (Zoom information will be informed later)

16:30 3-10
16:45 12-2
17:00 12-3

DAY 1: November 26, 2024 (Tuesday)

8:30 – 9:30 **Registration**

Opening Session in Auditorium (Room A)

9:30 – 9:55 **Opening Address**

Hisao OGAWA (President, Kumamoto University)

Opening Address

Kwun-Min CHEN (Executive Vice President, National Taiwan Normal University)

Welcome Address

Hiroshi ISOBE (Dean of Faculty of Advanced Science and Technology, Kumamoto University)

Welcome Address

Ching-Min CHENG (Dean of College of Technology and Engineering, National Taiwan Normal University)

Welcome Address

Jein-Shan CHEN (Dean of College of Science, National Taiwan Normal University)

Introduction of Kumamoto University

KU Student Organizing Committee

Introduction of National Taiwan Normal University

NTNU Student Organizing Committee

9:55 – 10:30 **Keynote Lecture** 1

Yasunobu NOHARA (Associate Professor, Kumamoto University)

"Building the Future with Data and AI

~Applications, Challenges and Future Prospects~"

10:30 – 11:05 **Keynote Lecture** 2

Saeed SAEEDVAND (Assistant Professor, National Taiwan Normal University)

"The General Concept of Artificial Intelligence: Principles and Applications"

11:05 – 11:25 **Report on International Experiences by students**

Si Thu Han (GSST, Kumamoto University)

"How to overcome difficulties and barriers in a student's life based on international experience"

Yi-Jia Liu (Department of Physics, National Taiwan Normal University)

" Broadening Horizons: Lessons in Cultural, Academic, and Personal Growth from International Experiences"

11:25 – 11:30 **Group photo**

11:30 – 14:00 **Lunch Break**

Parallel Sessions

14:00 – 15:00 **Session 1**
-Room A - D

15:00 – 15:15 **Coffee Break**

15:15 – 16:15 **Session 1**
-Room A – D

Cultural Exchange

16:45 – 17:45 Visiting NTNU Art Museum

DAY 2: November 27, 2024 (Wednesday)

8:30 – 9:30 **Registration**

Parallel Sessions

9:30 – 10:15 **Session 2**
-Room A - D

10:30 – 10:45 **Coffee Break**

10:45 – 11:45 **Session 2**
-Room A – D

11:45 – 14:00 **Lunch Break**

14:00 – 15:00 **Session 3**
-Room A - D

15:00 – 15:15 **Coffee Break**

15:15 – 16:00 **Session 3**
-Room A – D

Closing Ceremony in Auditorium (Room A)

16:30 – 17:00 Award presentation
Closing remarks

DAY 3: November 28, 2024 (Thursday)

Excursion

Taiwan Science Education Center
Taipei Astronomical Museum
ShiLin Night Market

List of Papers in Sessions

Day1, November 26, Tuesday 14:00 – 16:15

Session 1

- **Room A**

Research Session on **Electrical Engineering**

11-1	**Effect of pulsed current application on weed control** ***Kazuki Era, Kumamoto University***
11-2	**Enhancing AI-Generated Educational Visual Content** *Chiao-Hsin Wu, National Taiwan Normal University*
11-3	**From Text to Visuals: Leveraging Language Models for Accurate Object Quantity in Image Generation** *Ting Yu Cheng, National Taiwan Normal University*
11-4	**Ultra-short exposure imaging systems using multiple emICCD cameras** *Aika Chinen, Kumamoto University*
11-5	**Random Telegraph Noise Frequency Analysis Using CMOS Image Sensor Image Data** *Kotaro Kandori, Kumamoto University*
11-6	**Design of X-band Low Noise Amplifier Using 0.15-μm GaAs p-HEMT process** *Yu-ta Lo, National Taiwan Normal University*
11-7	**Investigation of velocity of pulsed ultrasonic wave by using optical wave microphone** *Si Thu Han, Kumamoto University*
11-8	**Determination of Anisakis inactivation by applying pulsed power** *Tomoki Yoshikawa, Kumamoto University*

- **Room B**

Research Session on **Materials Science and Engineering** and **Mechanical System Engineering**

7-1	**Bulk Vanadium Oxide Catalyst for Oxidative Coupling of 2-Naphthol** ***Ahmad Fahmi Prakoso, Kumamoto University***
7-2	**Glass Microfracture by Combining Underwater Gap Discharge and Explosives** *Shogo Tomoguchi, Kumamoto University*
7-3	**Graphene Oxide based Surface Plasms Resonance Biosensor for Sensing Pregnancy-Associated Plasma Protein-A and -A2 in Real-Time Detection** *Shih-Yuan Fan, National Taiwan Normal University*
7-4	**Enhancing Dielectric Constant in MIS Structures with Aluminum-Doped HfO_2** *Yu-Cheng Huang, National Taiwan Normal University*
8-1	**Study on Characteristics of COP Shift for Design of Assist Function for standing-up** *Hidenori Taira, Kumamoto University*
8-2	**Development of Vehicle Performance Evaluation Equipment Reproducing Electric Vehicle Competition Driving** *Gaku Hashimoto, Kumamoto University*
8-3	**Motor design guidelines for improving lap times in electric vehicle competition** *Keiichi Wakata, Kumamoto University*
8-4	**Development of Big Data Ensemble Learning Techniques for Establishing Multi-Quality Target Prediction in Injection Molding** *Jhih-heng Sun, National Taiwan Normal University*

- **Room C**

Research Session on **Biological Sciences** and **Multidisciplinary**

5-1	**Effects of different codon optimization strategies and gene dosages on the production of Thermomyces lanuginosus lipase in Komagataella phaffii** ***Yu Hung, National Taiwan Normal University***
5-2	**Development of Active Plasmonic for biosensor** *YuLiang Li, National Taiwan Normal University*
5-3	**Application of SPR biosensor in detecting Ck19 protein in lung cancer** *Ching-Hsuan Wang, National Taiwan Normal University*
5-4	**Development of an SPR-Raman Sensing Chip for Early Diagnosis in Lung Cancer** *Jou-Chen Lin, National Taiwan Normal University*
5-5	**Targeting Necroptosis and ECM Remodeling in ADPKD: The Therapeutic Potential of Indanedione-based Compound 4l** *Devapatla Pallavi, National Taiwan Normal University*
5-6	**The Relationship Between Size and Ecophysiological Traits of Three Epiphytic Fern Species** *Jui Hsin Chou, National Taiwan Normal University*
14-1	**A near-infrared module for moisture content of soybean residue in the drying process** *Yu-Fen Yen, National Taiwan Normal University*
14-2	**Vision-Based Autonomous Mobile Robot Control System: Solutions in Indoor/Outdoor Environments** *Guan-Yu Cheng, National Taiwan Normal University*

- **Room D**

Research Session on **Physics** and **Applied Mathematics**

2-1	**Morphology and Electrical Properties Changes of $ReSe_2$ Surface by Fe Atoms Deposition** ***Yu Chieh Lo, National Taiwan Normal University***
2-2	**Static and Dynamic Properties of Liquid Lactic Acid Based on Ab Initio Molecular Dynamics Simulations** *Kai Ito, Kumamoto University*
2-3	**Static and Dynamic Structure of Liquid Malic Acid Based on First-Principles Molecular Dynamic Simulations** *Wataru Sugimoto, Kumamoto University*
2-4	**Fermi momentum behavior of liquid alkali metals by Compton Profile analysis** *Shota Takahira, Kumamoto University*
2-5	**Anomalous Electrical Resistivity in Liquid Si: Effects of Ion Structure and Potential** *Yu Taguchi, Kumamoto University*
2-6	**Numerical Analysis of LMR Biosensors Based on Transition Metal Dichalcogenide: Exploring Wavelength and Thickness Effects** *Devi Taufiq Nurrohman, National Taiwan Normal University*
2-7	**Overcoming Geometric Constraints in Light Sheet Microscopy with Dihedral Corner Reflector Array** *Cong-Wei Yao, National Taiwan Normal University*
9-1	**Theoretical Mathematical Study of the Hodgkin-Huxley Equations** *Taishi Kamimura, Kumamoto University*

Day2, November 27, Wednesday 9:30 – 11:45

Session 2

- **Room A**

Research Session on **Electrical Engineering**

11-9	**Large-scale recycling of cathode materials for automotive lithium-ion batteries by using pulsed power** ***Daisuke Yamashita, Kumamoto University***
11-10	**Distribution of streamer propagation velocity during nanoseconds pulsed discharge** *Yoichi Hirakawa, Kumamoto University*
11-11	**Observation of spatio-temporal ozone distribution during nanosecond pulsed discharge** *Takumi Takaki, Kumamoto University*
11-12	**Design of a 28 GHz GaAs E-mode pHEMT Power Amplifier** *Chien-Hua, Chen, National Taiwan Normal University*
11-13	**Plasmonic Half-adder Logic Operator** *Jou-Yun Li, National Taiwan Normal University*
11-14	**A Low-Power First-Order Current-Controlled Oscillator-Based Delta-Sigma Analog-to-Digital Converter** *Chien-Hung Liao, National Taiwan Normal University*
11-15	**An Energy-Efficient Zoom ADC Using Noise-Shaping SAR With a CIFF Architecture** *Jo-Chieh Lin, National Taiwan Normal University*
11-16	**A Low-Power Close-loop VCO-based ADCs Using a Pseudo-differential Architecture** *Chen-An Wang, National Taiwan Normal University*

- **Room B**

Research Session on **Chemistry** and **Applied Chemistry**

3-1	**A First-Principle Simulation Study of CO_2 Reduction by Bi(iii) Oxide Nanoparticle** ***Hsin-Chen Lin, National Taiwan Normal University***
3-2	**Proton Blocking Membrane using Pore-free Graphene Oxide** *Tatsuki Tsugawa, Kumamoto University*
3-3	**Exfoliation and characterization of silver layered compounds** *Riko Samatsu, Kumamoto University*
3-4	**Synthesis of Fe-doped TiO_2 nanosheets and photocatalytic activity evaluation** *Yumi Katsuki, Kumamoto University*
6-1	**Acetone Gas Detection Properties and Sensing Mechanism of Amorphous In-Sn-Zn Oxide Nanoparticles** *Yu Jono, Kumamoto University*
6-2	**Development of an Electrochemical Gas Sensor using Proton Conductive Graphene Oxide with MOF Catalyst** *Mana Yamaguchi, Kumamoto University*
6-3	**Synthesis of deuterium labeled compounds using graphene oxide membrane reactor** *Ami Takase, Kumamoto University*
6-4	**Ring-opening reaction of epoxides with alcohols by Silica-supported vanadium oxide catalyst** *Minami Murakami, Kumamoto University*

- **Room C**

Research Session on **Computer Science**

10-1	**Efficacy of Sentiment Analysis Using Hybrid Deep Learning Methods in Dynamic Social Networks** ***Al, Amin, Kumamoto University***
10-2	**Design of an e-learning Program for Tutors to Support International Students based on FPI and ARCS Model** *Yu Hirayama, Kumamoto University*
10-3	**Enhanced CVRP Solutions through Cluster-First Route-Second Strategies and Metaheuristics** *Akhdan Arifuddin, Kumamoto University*
10-4	**Creating Generative AI Video for Farmer Assistance with IoT Data** *Elisha Elikem Kofi Senoo, Kumamoto University*
10-5	**Category-Level 6D Pose Estimation for Robot Grasping Using a Transformer-Based Model** *Chia-Tse Lai, National Taiwan Normal University*
10-6	**Enhancing the BoT-SORT Tracker with Advanced Person Re-identification Using Polynomial Cross Entropy Loss** *Shao-Kang Huang, National Taiwan Normal University*
10-7	**Lightweight Retinex-based Deep Learning Network for Power-Efficient Image Display** *Yu-Shao Wang, National Taiwan Normal University*
10-8	**Sentiment Analysis using Large Language Models for Interactions between Taiwanese Parents and Children** *Jacky Baltes, National Taiwan Normal University*

- **Room D**

General Session

G-1	**Automatic Exterior Wall Tile Inspection Robot** ***Lin Hsin Hung, National Kaohsiung University of Science and Technology***
G-2	**Automatic campus sprinkler vehicle** *Kai-Chi Wang, National Kaohsiung University of Science and Technology*
G-3	**Recent Trends in Research about Water Retaining Capacity of Bacillus Natto** *Koko Ishida, Kumamoto University*
G-4	**Making the flower pots with sludge** *Haruka Inao, Uto High school*
G-5	**Light and Shadow Created by an Object in an Aqueous Solution** *Miyu Daikoku, Uto High school*
G-6	**The Investigation of Interface Trap Density for Al-doped HfO_2 Thin Films Fabricated by Atomic Layer Deposition** *Juan Yi-Hui, National Taiwan Normal University*
G-7	**The Influence of Al concentration in HfAlO dielectric films** *Chen Han Lee, National Taiwan Normal University*
G-8	**Quick storm surge prediction using process- and statistics-based models** *Daiki Asahiro, Kumamoto University*

Day2, November 27, Wednesday 14:00 – 16:00

Session 3

- **Room A**

Research Session on **Electrical Engineering** and **Materials Science and Engineering**

11-17	**A Low-Power Third-Order Noise-Shaping SAR ADC With an Error Feedback Architecture** ***Yu-Ting Lin, National Taiwan Normal University***
11-18	**19GHz Low Noise Amplifier** *Ching-Wen Chang, National Taiwan Normal University*
11-19	**Precise Object Balance Control with Dual-Arm Robot** *Mingyuan Wu, National Taiwan Normal University*
11-20	**A Low-Power Area-Efficiency Current-Controlled Oscillator-Based Delta-Sigma Modulator** *Po-Wei Tsai, National Taiwan Normal University*
11-21	**A 2+1 SMASH ADC With Half-Step SAR Quantization** *Chi-Chieh Weng, National Taiwan Normal University*
7-5	**Ultrafast Laser Induced Periodic Surface Structures for Metallic Biomaterial Interfaces** *Chen Yuan-Jun, National Taiwan Normal University*
7-6	**Room-Temperature IoT Gas Sensor Based on Femtosecond laser-induced ZnO nanowire/rGO heterostructure** *Liu Shen-Yu, National Taiwan Normal University*

- **Room B**

Research Session on **Chemistry** and **Applied Chemistry**, and **Civil and Environmental Engineering**

3-5	**Synthesis of Sulfonyl Compounds via Amine Catalysis and their Application as Highly Reactive Enone Precursors for Catalytic Wittig Reaction and Futher Application** ***Pei-Shan Wu, National Taiwan Normal University***
3-6	**Diversity-oriented synthesis of chromone inden-1-one-fused cyclopentadienylides and C-acylated chromone adducts via allylic phosphorus ylides** *Durga Prasad Gurram, National Taiwan Normal University*
3-7	**Electroplated copper plating with Ru seed layer for next-generation semiconductor devices** *Miamu Watanabe, Kumamoto University*
3-8	**Regiodivergent Asymmetric Access to Synthesis of Intricate Spiro-pyrazolone Scaffolds under Control by Brønsted Base and Solvent** *Ganesh Shantaram Khomane, National Taiwan Normal University*
3-9	**Electrophilic Halogenation of Allenoates and 3-Alkynoates: Synthesis of 1,4-Dicarbonyl 3-(E)-Haloalkenes and Mechanistic Investigations** *Yumnam Nganthoinganbi, National Taiwan Normal University*
6-5	**Fluorescence Switching of Diarylethene Nanoparticles in Organic Solvents** *Shuto Mitsui, Kumamoto University*
12-1	**An attempt of Shinkansen railroad noise map estimation for Kumamoto Prefecture** *Yota Kawano, Kumamoto University*

- **Room D**

Research Session on **Earth and Environments,** and **Architecture**

4-2	**Analysis Chances of an Earthquake Occurring use GEOSTAT V2.0 Software and Shock Level Scenarios in South Sulawesi Province** ***Takhul Bakhtiar, National Taiwan Normal University***
4-1	**Intra-event changes in stable isotope ratios of precipitation using automatic samplers in 2023** *Tatsuki Otake, Kumamoto University*
4-3	**Sedimental Environment and Taphonomy of the Fossil Mayfly Larvae from the Middle Pleistocene Shiobara Group** *Yoshitaka Itakura, Kumamoto University*
4-4	**Effect of the organic mineral on Mg/Fe fractionation in the early solar system** *Kanako Yoshihara, Kumamoto University*
4-5	**Palaeoecology of Trapezilites minimus (Arthropod) from the Alum Shale Formation, southern Sweden** *Ayari Yanagihara, Kumamoto University*
13-1	**A study on the attenuation of booming in a conference room using air column resonators** *Jun Sasaoka, Kumamoto University*
13-2	**Indoor Thermal Comfort in Tropical Urban Areas: How to Improve Low-Cost Housing in Abuja, Nigeria** *Augustine Bassey Ignoke, Kumamoto University*

December 9, Monday 14:30 – 17:15

Online Session

Research Session on **Chemistry** and **Civil and Environmental Engineering**

3-10	**Synthesis and photocatalytic of LaTiO2N using titanium oxide nanosheet/La3+ hybrids as a precursor** *Xiong Tao, Kumamoto University*
12-2	**Study of bearing load and failure mode of post-installed adhesive anchors fixed in large-diameter holes** *Hui Gao, Kumamoto University*
12-3	**Valuation of the Usability of Urban Riverside Greenways Based on Public Interaction - A Case Study of the Shirakawa Riverside in Chuo Ward, Kumamoto City** *Fangzhu Zhou, Kumamoto University*