The 20th International Student Conference On Advanced Science and Technology (ICAST) 2025 Chiayi

November 26 – 27, 2025

Organized by

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

College of Science and Engineering, National Chiayi University (NCYU), 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:

Presentations mainly by undergraduate and high school students on projects, opinions, and ideas on issues related to science and engineering, and topics on SDGs in the field of science and engineering.

SCHEDULE 20th ICAST 2025

Day 1, Wednesday 26 November, 2025

Time				
9:30-11:30	Opening Session Auditorium			
	Lunch			
	Session 1			
	A	B	C	D
13:45	13-1	4-1	6-1	8-1
14:00	13-2	4-2	6-2	8-2
14:15	13-3	4-3	6-3	8-3
14:30	13-4	4-4	6-4	8-4
14:45-15:05	Coffee break			
15:05	13-5	5-1	6-5	8-5
15:20	13-6	5-2	6-6	8-6
15:35	13-7	5-3	6-7	8-7
15:50	13-8	12-1	6-8	8-8
16:30-17:30	Campus tour			

Day 2, Thursday 27 Novemver, 2025

Time	Session 2			
	A	B	C	D
9:30	2-1	10-1	6-9	8-9
9:45	2-2	10-2	6-10	8-10
10:00	2-3	10-3	3-1	7-1
10:15	2-4	10-4	3-2	7-2
10:30-10:50	Coffee break			
10:50	2-5	10-5	3-3	7-3
11:05	2-6	10-6	11-1	7-4
11:20	2-7	10-7	11-2	9-1
11:35	2-8	10-8	11-3	
	Lunch			
	Session 3			
	A	B	C	D
13:45	2-9	10-9	G-1	
14:00	11-4	10-10	G-2	
14:15	11-5	10-11	G-3	
14:30	11-6	10-12	G-4	
14:45-15:05	Coffee break			
15:05	11-7	10-13	G-5	
15:20	11-8	10-14	G-6	
15:35	11-9	10-15	G-7	
15:50	11-10	12-2		
16:30-17:00	Closing Ceremony Auditorium			

Venue: College of Science and Engineering Hall

Room A: Rm 104

Room B: Rm 204

Room C: Rm 401

Room D: Rm 808

Satellite Online Session

Dec 11, Thursday 14:30-17:45 (JST) *Zoom information will be announced later.

14:30-15:00	Opening
15:00-16:00	G-8
	G-9
	G-10
	G-11
16:00-17:45	3-4
	6-10
	6-11
	7-7
	8-12
	14-1
	14-2

DAY 1: November 26, 2025 (Wednesday)

8:30 – 9:30 **Registration**

Opening Session in Auditorium

9:30 – 10:05 **Opening Address**

Hisao OGAWA (President, Kumamoto University)

Opening Address

Han Chien Lin (President, National Chiayi University)

Welcome Address

Toshihiro IHARA (Dean, Graduate School of Advanced Science and Technology, Kumamoto University)

Welcome Address

Roy Chaoming Hsu (Dean, College of Science and Engineering, National Chiayi University)

Introduction of Kumamoto University

KU Student Organizing Committee

Introduction of National Chiayi University

Wen-Chi Cheng, NCYU Student Organizing Committee

10:05 – 10:45 **Keynote Lecture** 1

Masahiro AOYAGI (Professor, Kumamoto University)

" Challenges in Achieving Higher Integration, Functionality, and Performance through Advanced Semiconductor Packaging Technology"

10:45 – 11:35 **Keynote Lecture** 2

Ching-Hung Chang (Professor, National Chiayi University)

"Forging Resilience in 5G/6G Networks: Optimized Radio-over-Fiber (RoF) Transport Systems with Enhanced Health Detection"

11:35 – 11:55 **Report on International Experiences by Students**

1. Hadirah Binti Ahmad Radzuan (GSST, KU)

"My Experience as an International Student: Challenges, Discoveries, and Growth"

2. Chiang Hao Yuan (Dept of Mechanical and Energy Engineering, NCYU)

"Away from Home: My Journey Through Cultural Challenges Abroad"

11:55 – 12:00 **Group photo**

12:00 – 13:45 **Lunch Break**

Parallel Sessions

13:45 – 14:30 Session 1
-Room A - D

14:45 – 15:05 Coffee Break

15:05 – 15:50 Session 1
-Room A – D

Campus tour

16:30 – 17:30 Visiting NCYU Memorial Hall

DAY 2: November 27, 2025 (Thursday)

8:30 – 9:30 **Registration**

Parallel Sessions

9:30 – 10:15	**Session 2** -Room A - D
10:30 – 10:50	**Coffee Break**
10:50 – 11:35	**Session 2** -Room A – D
11:35 – 13:45	**Lunch Break**
13:45 – 14:30	**Session 3** -Room A - C
14:45 – 15:05	**Coffee Break**
15:05 – 15:50	**Session 3** -Room A – C

Closing Ceremony in Auditorium

16:30 – 17:00 Award presentation
Closing remarks

DAY 3: November 28, 2025 (Friday)

Excursion

Southern Branch of National Palace Museum (SBNPM).
Mazu Temple (媽祖廟)
Fisherman's warf, if time permitted.

List of Papers in Sessions

Day1, November 26, Wednesday 13:45 – 16:05

Session 1

- **Room A**

Research Session on **Architecture**

13-1	**Study on shear reinforcement method for RC beams using UHPFRC panel side bonding (Part 2) FEM analysis** ***Yosuke Hiroshi, Kumamoto University***
13-2	**Impact of Diurnal Temperature Range on Low-Cost Housing Thermal Comfort during Transition Seasons in Abuja, Nigeria** *Augustine Igboke, Kumamoto University*
13-3	**A field experiment on the effect of sound absorption on acclimation of 2- and 3-years old children to kindergarten** *Ikuri Matsuoka, Kumamoto University*
13-4	**Fundamental Study on Evaluation Methods for Speech Transmission Performance Using Automatic Speech Recognition** *Sohta Imanaka, Kumamoto University*
13-5	**Noise map estimation of Shinkansen Super Express Railway along the Kyusyu Shinkansen whole line** *Tomoki Yasutake, Kumamoto University*
13-6	**Fild measurements and assessment of conventional railway noise in Kumamoto** *Kosuke Numa, Kumamoto University*
13-7	**A field survey of acoustic environment in academic library—Influence of surrounding acoustic environment on seat selection by single user** *Ryoya Bando, Kumamoto University*
13-8	**Sound Event Detection of Children's Crying for Acoustic Environment Evaluation in Kindergarten Classrooms** *Reo Hori, Kumamoto University*

- **Room B**

Research Session on **Earth and Environments, Biological Sciences** and **Civil and Environmental Engineering**

4-1	**Quantitative Analysis of the Impact of Realization Selection on Future Climate Change Impact Assessments Using CMIP6 Data** ***Koichi Nagata, Kumamoto University***
4-2	**Short-Term Isotopic Variations of Typhoon-Related Precipitation in Kumamoto** *Teru Nagaoka, Kumamoto University*
4-3	**Precipitation Isoscapes Over the Indonesian Archipelago Using Regional Fuzzy Clustering: A Study** *Ilyas Nurfadhil Basuki, Kumamoto University*
4-4	**Ancient color preserved in fossil insect** *Yoshitaka Itakura, Kumamoto University*
5-1	**Effect of degumming conditions on the function of silk fibroin film** *Masaya Harda, Kumamoto University*
5-2	**Application of Thiol-Protected Silver Nanoparticles for Colorimetric Evaluation of Honey Authenticity** *Tong-Shiun, Li, National Chiayi University*
5-3	**Using SAM2 to evaluate the health of shrimp larvae** *Chiu, Tsai-Hsien, National Chiayi University*
12-1	**Soil Classification and Characterization Using k-means Clustering of the National Geotechnical Information Data** *Satori Teruya, Kumamoto University*

- **Room C**

Research Session on **Applied Chemistry**

6-1	**Conductive Thin Films fabricated from Heteroatom-Containing Aromatic Addition-Condensation Polymers** ***Ayaka Ninomiya, Kumamoto University***
6-2	**Development of PEG-Grafted PDMS Composite Membranes for CO_2 Membrane Separation** *Chika Nishiyashiki, Kumamoto University*
6-3	**Effect of Thiol Molecular Structure on the Resistance of Silver Nanoplates to Halide Ion Etching** *Jun-Sheng Wu, National Chiayi University*
6-4	**Photochemical Synthesis of Silver Nanoparticles with Controlled Morphologies for Kinetic and Critical Concentration Studies of Thiol Adsorption** *Yi-Rong Yang, National Chiayi University*
6-5	**Hybrid Materials of $CsPbBr_3$ Quantum Dots and Polyoxometalates for Visible-Light-Induced Solar Energy Conversion and Storage** *Kona Sumi, Kumamoto University*
6-6	**Role of Organic Solvents in the Spontaneous Resolution of $CsCuCl_3$** *Suwan Yamada, Kumamoto University*
6-7	**Exploring the Adsorption Kinetics of Different Thiol Molecules on Silver Nanoparticles Using Time-Dependent Spectroscopy** *I-YU Lai, National Chiayi University*
6-8	**Detection of P-loaded SnO2 Sensor for Detecting organophosphorus gases** *Shibata Kanna, Kumamoto University*

- **Room D**

Research Session on **Mechanical System Engineering**

8-1	**Study on the interfacial strength of thin films using nanoindentation** ***Chiang Hao Yuan, National Chiayi University***
8-2	**Optical Optimization Analysis of a Curved Light Guide Plate with Trapezoidal Microstructures Using Injection-Compression Molding through a Local–Global Approach** *Yong-Lun Hsiao, National Chiayi University*
8-3	**Manufacturing Optimizations on Injection Compression Molding Processing of Aspheric lenses using Moldflow Simulation** *Shan-Wei Lai, National Chiayi University*
8-4	**Analysis of Residual Stress and Total Warpage Displacement in Hyperbolic Lens Injection Molding** *Lin, Chun-Miao, National Chiayi University*
8-5	**Material Substitution and Moldflow Analysis of Optical Pentagonal Prisms** *Chen, Kuan-chi, National Chiayi University*
8-6	**Analysis of the injection compression molding process for wedge-shaped light guide plates** *Rui-Chen Zhou, National Chiayi University*
8-7	**Optical Optimization Analysis of a Freeform Auxiliary Mirror in the Injection Molding Process** *Sheng-Jie Fong, National Chiayi University*
8-8	**Optimization Analysis of the Injection Molding Process for Powell Lens** *Guan-Lin Li, National Chiayi University*

Day2, November 27, Thursday 9:30 – 11:50

Session 2

- **Room A**

Research Session on **Physics**

2-1	**The influence of the horizontal and vertical spacing variation of three single mode fibers interferometric array point imaging** *WenChi Cheng, National Chiayi University*
2-2	**Influence of graphene oxide doping ratio on the properties of PEDOT:PSS hole transport layer** *YunChi Chin, National Chiayi University*
2-3	**Angular Sensing of Single Mode Fiber Reflection Power Variation** *Shao-Feng Liao, National Chiayi University*
2-4	**Effects of various temperature annealing on the characteristics of AgNiO/Si heterojunction diodes** *Yu-Hsun Lin, National Chiayi University*
2-5	**Systematic Analysis of Magneto-Optical Effects in Magnetic Nanofilms on Sapphire Substrates with Different Crystal Orientations Treated by Oxygen Plasma** *You-da Tsai, National Chiayi University*
2-6	**Ab Initio Study of Local Structure and Intermediate-Range Order in Liquid Hydroxy Carboxylic Acids** *Wataru Sugimoto, Kumamoto University*
2-7	**Enhancement of the photoelectric properties of WO_3/Cu/WO_3 transparent electrodes using silver seed layers and their application in organic light-emitting diodes** *Yu-Cheng Kuo, National Chiayi University*
2-8	**Effects of Multiple Quantum Wells on the Optoelectronic Properties of Green Organic Light-Emitting Diodes** *Yu-Chi Fang, National Chiayi University*

- **Room B**

Research Session on **Computer Science**

10-1	**Enhancing Image Generation Quality with Integration of LoRA and Semantic Segmentation** ***You-Jyun Peng, National Chiayi University***
10-2	**Applying Machine Learning Theory to Athlete Motion Tracking and Analysis: A Case Study on Baseball Players** *Cheng-Han Lin, National Chiayi University*
10-3	**Improving Multipath TCP Transmission Efficiency with Software-Defined Networking** *Chun Yip Fua, National Chiayi University*
10-4	**A Study of Bamboo Forest Semantic Segmentation Using Deep Learning Methods with Visual Interpretability** *Chun Hong Chou, National Chiayi University*
10-5	**Implementation of Selective In-band Network Telemetry** *Kan-Yi Zhou, National Chiayi University*
10-6	**TestGen: the generation and optimization of test scripts based on LLM** *Chang Yu-Chuan, National Chiayi University*
10-7	**Enhancing In-Band Network Telemetry with Source Routing in Multi-Path Topologies** *Zhi-Xiang Lu, National Chiayi University*
10-8	**MeetGenius: An Intelligent Meeting Record Generation System** *Nian-Xin Zhao, National Chiayi University*

- **Room C**

Research Session on **Chemistry, Applied Chemistry** and **Electrical Engineering**

6-9	**Building an immobilized visual analysis technique based on silver nanotriangles** ***Yi-Zhen Xu, National Chiayi University***
6-10	**Optimized Fe–Mo Bimetallic Catalysts for Efficient Low-Temperature for Oxidative Coupling of 2-Naphthol** *Ahmad Fahmi Prakoso, Kumamoto University*
3-1	**Biomass oxidation reaction with using subcritical water and microwave irradiation** *Risa Fukuda, Kumamoto University*
3-2	**Enhanced Activity and Stability of Carbon Nanodot-Immobilized N450D Mutant Bacillus licheniformis γ-Glutamyltranspeptidase** *Yuh-Huei Lin, National Chiayi University*
3-3	**Lightweight $CoMoO_4$/rGO Aerogels with Dual Microwave Absorption and Thermal Insulation Performance** *Adnan Khalid, Kumamoto University*
11-1	**Effect of the Parameters Influencing Plasma Energy on the Intensity of Plasma induced Pressure Wave** *Keren Ni Dawt Hniang, Kumamoto University*
11-2	**Analysis of underwater pulsed discharge using the shape factor method** *Kodai Izuno, Kumamoto University*
11-3	**Temporal evolution of the reduced electric field in nanosecond pulsed streamer discharges in atmospheric pressure air** *Keidai Matsumoto, Kumamoto University*

- **Room D**

General Session on **Material Science and Engineering, Mechanical System Engineering,** and **Applied Mathematics**

8-9	**Standing Assist Function Design based on Dynamic Characteristic Evaluations for Outdoor Wheelchairs** ***Hidenori Taira, Kumamoto University***
8-10	**Geometric Variation Analysis of Curved Microlens Arrays in Injection Compression Molding** *Chun-Tsan Wu, National Chiayi University*
7-1	**LIGHT-ACTIVATED VOC GAS SENSORS USING DOPED METAL OXIDES** *Papitchaya Khunjan, Kumamoto University*
7-2	**Crystal Phase Analysis of HfO2/ZrO2 Nanolaminate Thin Films** *Ryu Kawamura, Kumamoto University*
7-3	**Mixed-Conducting GO Membranes Functionalized with Metal Cations and Conductive Polymers for Hydrogen Separation** *Ghina Kifayah Putri, Kumamoto University*
7-4	**Application of MoO_3:Ag Layer as Hole Injection Layer for Organic Light-Emitting Diodes** *Xi-Qian Chen, National Chiayi University*
9-1	**EXISTENCE AND STABILITY OF PERIODIC SOLUTIONS FOR THE HODGKIN–HUXLEY SYSTEM UNDER TIME-PERIODIC EXTERNAL FORCE** *Taishi Kamimura, Kumamoto University*

Day2, November 27, Thursday 13:45 – 16:05

Session 3

- **Room A**

Research Session on **Physics** and **Electrical Engineering**

2-9	**Study on the electroluminescent properties of blue organic light-emitting diodes with quantum well structure** ***Su Hsiao Ting, National Chiayi University***
11-4	**Design a Three-Input Multi-Logic Gate Circuit Based on MOS-NDR Devices** *Meng-You Li, National Taiwan Normal University*
11-5	**Design of a Negative Differential Resistance Multi-Threshold Comparator for Analog-to-Digital Converters** *Shu_Hao Chang, National Taiwan Normal University*
11-6	**C–V characterization for evaluation of interface in Al2O3/GaN MOS capacitors with Al2O3 thin film fabricated by Mist-CVD** *Hadirah Binti Ahmad Radzuan, Kumamoto University*
11-7	**Effect of cumulative gamma ray irradiation on Hall effect measurement Result and static DC of AlGaN/GaN HEMT** *Irie Manato, Kumamoto University*
11-8	**Simulation of Autonomous Vehicle with Car-Following and Overtaking Capabilities** *Tingwen Xiao, National Taiwan Normal University*
11-9	**WO_3/Ag/Cu/WO_3 Transparent Conductive Films and Their Application in OLEDs** *Hao-Wei Tsai, National Taiwan Normal University*
11-10	**Study on the Photodetection Performance of NiO/p-Si Heterojunction Photodiodes by Sol–Gel Processing** *Yu-Xin Feng, National Kaohsiung University of Science and Technology*

- **Room B**

Research Session on **Computer Science**, and **Civil and Environmental Engineering**

10-9	**SDN Routing Optimization Based on GNN and GRPO** ***Chia-Yi Chou, National Chiayi University***
10-10	**Implementation of an IPoMP Gateway for SD-WAN** *Zhi-Lin Li, National Chiayi University*
10-11	**Efficient Parallel-Qubit Implementation of the BB84 Quantum Key Distribution Protocol on NISQ-era IBM Quantum Devices** *Yu-Chieh Chang, National Chiayi University*
10-12	**Lightweight IoT-Integrated Resource-Aware Assistants for Audiovisual Experience** *Elisha Senoo Elikem Kofi, Kumamoto University*
10-13	**A lightweight Zero-trust Framework Integrated with Physical Unclonable Function and Continuous Behavior Monitoring** *Yu-Han Wang, National Chiayi University*
10-14	**Robust Backdoor Detection in Federated Learning - From Unified Evaluation to Zone-wise Analysis** *Dao-Xiang Yao, National Chiayi University*
10-15	**A low-cost autonomous outdoor robot with stabilized controller and deep-learning integrated GPS navigator under end-to-end implementation** *Joseph Chou, National Chiayi University*
12-2	**Evaluation of the Relationship Between Input Data and the Extrapolation Capability of Deep Learning in Rainfall-Runoff Modeling** *Junsei Shichida, Kumamoto University*

- **Room C**

General Session

G-1	**Cerebral organoids** ***Koko Ishida, Kumamoto University***
G-2	**An SDN and Deep Learning-Based Intelligent Security Monitoring and Dynamic Access Control System for Enterprise Networks** *Yu Chen Liu, National Chiayi University*
G-3	**Penetration Testing and Defense Remediation on Large Language Model(LLM)** *Bryan Bong, National Chiayi University*
G-4	**Weekday Variations in Autonomic Nervous System Activity** *Manaya Ohira, Uto Junior and Senior High School*
G-5	**Research on the mysterious fire phenomenon called Shiranui** *Mai Horita, Uto Junior and Senior High School*
G-6	**Research on Maturity Identification and Quality Grading of Oncidium Based on Deep Learning and Implementation in GPU-based Embedded Systems** *Min Hsien Tsai, National Chiayi University*
G-7	**Green energy STEAM education promotes localization of sustainability** *Guan Chen Guo, National Chiayi University*

Satellite Online Session

December 11, Thursday 14:30 – 17:45

14:30 – 15:00 **Opening remarks, University introduction, etc.**

15:00 – 16:00 General Session

G-8	**The Effect of Moulds on Mechanical Properties of Al-Alloy** ***Rishith Chandan Jain, Alva's Institute of Engineering and Technology***
G-9	**Review on Cooling Methods Used in Electronic Packaging** *Vinay Kumar S, Alva's Institute of Engineering and Technology*
G-10	**Study on the formation of IMCs between Solder and Iron** *Nishanth S P, Alva's Institute of Engineering and Technology*
G-11	**The Catalyst of Clarity: The Role of English Education in Advancing Science and Technology** *Firstian Alvin Rozaq, Islamic University of Indonesia*

16:00 – 17:45 Research Session on **Chemistry, Applied Chemistry, Materials Science and Engineering, Mechanical System Engineering,** and **Multidisciplinary**

3-4	**Humic Acid Fouling of Anion Exchange Membranes Utilized for Reverse Electrodialysis Applications** ***Fulya Mordoğan, Ege University***
6-10	**Utilization of Electrodialysis for Simultaneous Separation and Recovery of Lithium from Waste Effluents Containing High Concentration of Boron** *Pelinsu Çamcı and Mert Deniz, Ege University*
6-11	**Performance Comparison of Co-Flow and Counter-Flow Configurations in Reverse Electrodialysis** *Taha Furkan Gül, Ege University*
7-7	**Development of UiO-66-2 MOF Based Anion Exchange Membranes for Improved Monovalent Ion Selectivity** *Minel Akalın, Ege University*
8-12	**Comprehensive review of processes, Materials, Development, and Challenges of Additive Manufacturing** *Vishwas Konda, Alva's Institute of Engineering and Technology*

14-1	**Process Design and Carbon Footprint Analysis of the Production of PUFA-rich Thraustochytrid Biomass using Distillery Wastewater for Fish Feed/Ingredient** *Joshua Enrique Ignacio, University of the Philippines Los Baños*
14-2	**Design of Novel Medical Aspirator Connector for Cesarean Sections** *James Mbabila Naya, University of Ghana*