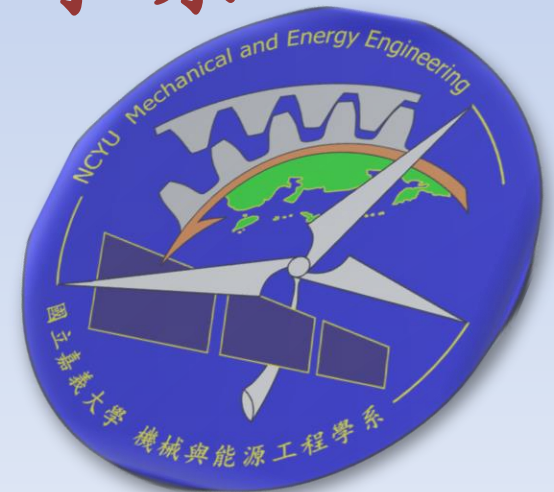


National Chiayi University

**Department of Mechanical and
Energy Engineering**

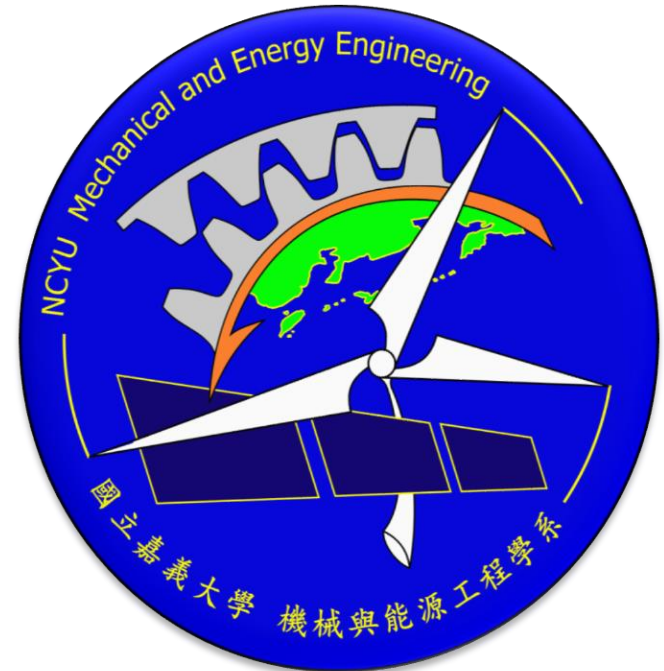
機械與能源工程學系



Vision and Mission

The Departmental Logo shows:

- ❑ To develop Energy Conservation technologies based on mechanical engineering.
- ❑ To glorify the local through worldwide participation.



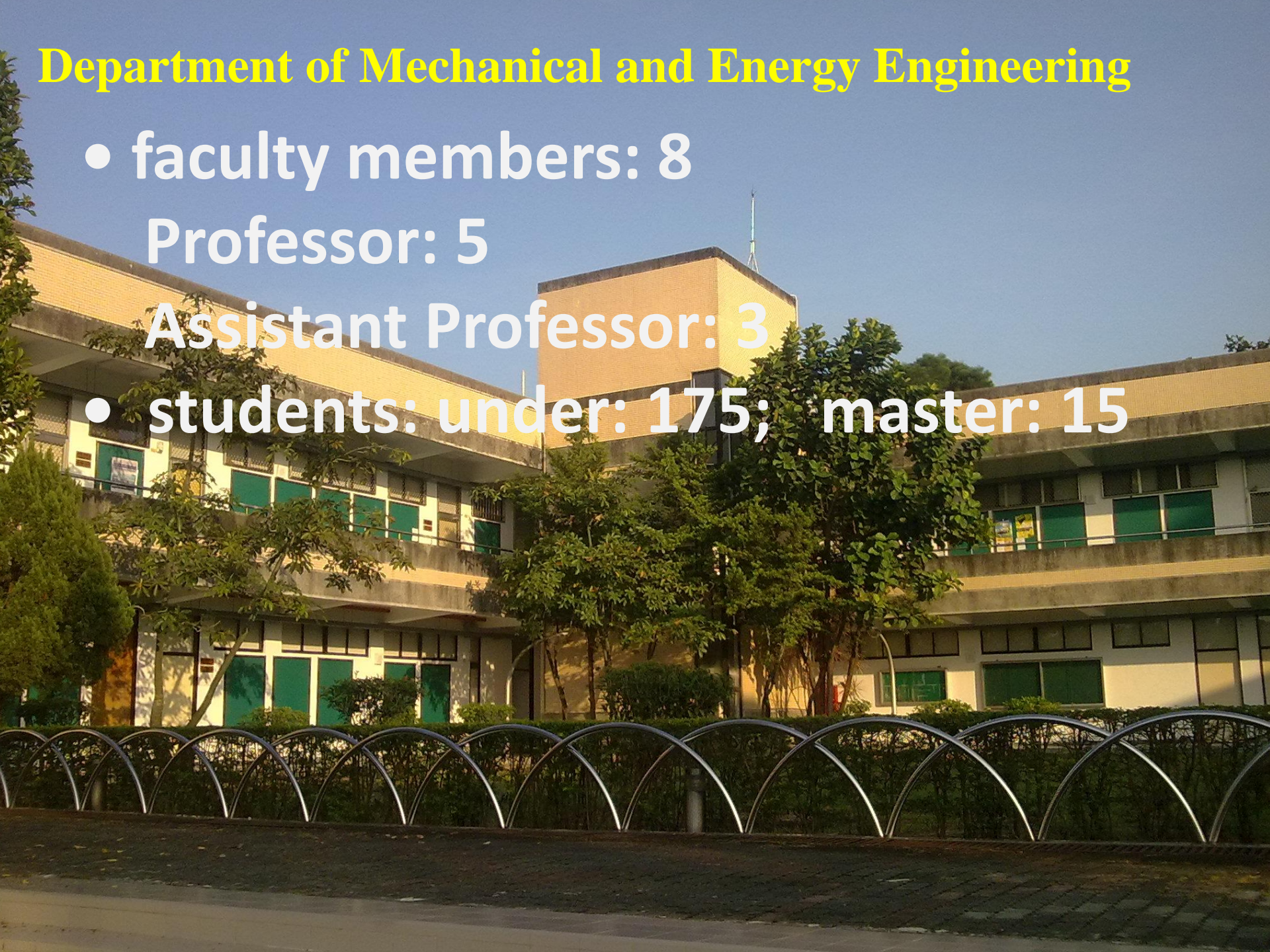
Department of Mechanical and Energy Engineering

- faculty members: 8

Professor: 5

Assistant Professor: 3

- students: under: 175; master: 15



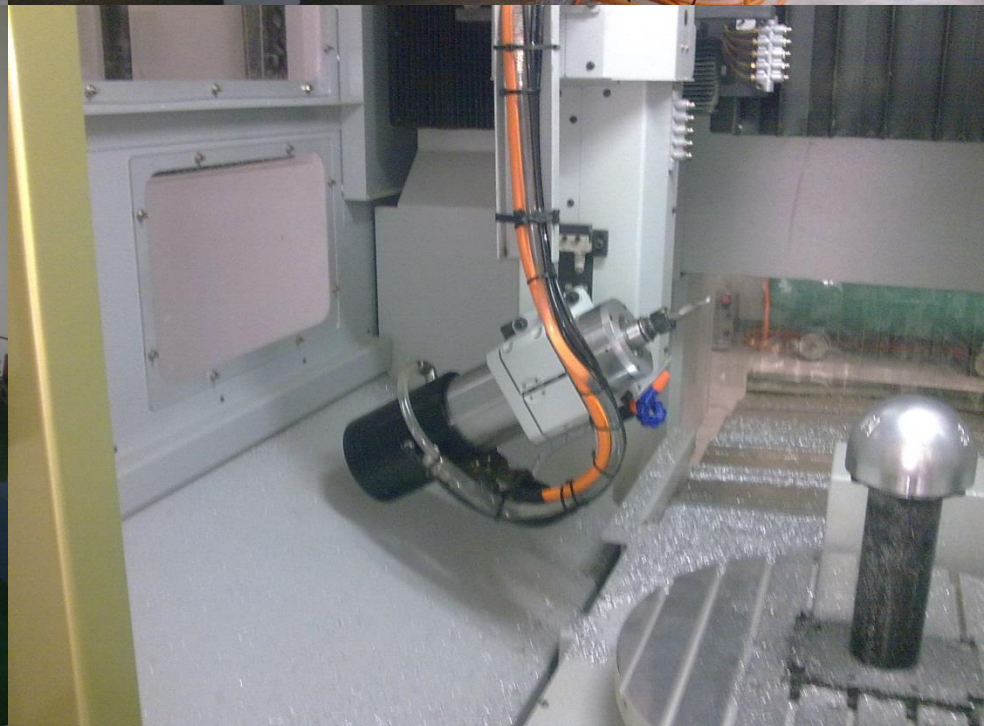
Major Facility:

Precision Manufacturing Lab.

Computer Aided Engineering Lab.

Heat, Flow, and Energy Lab.

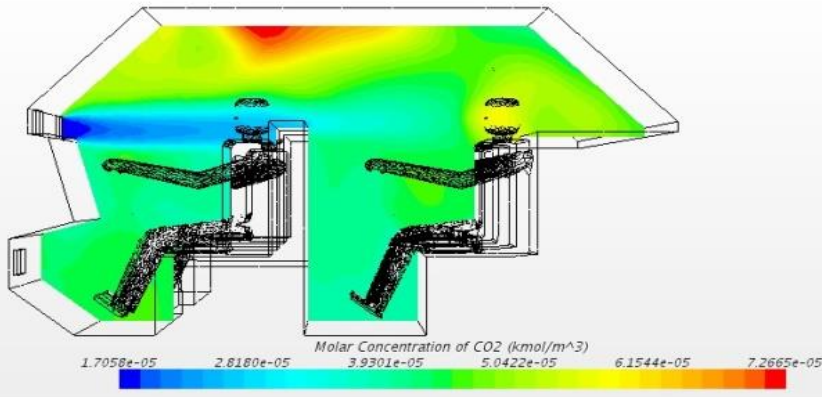
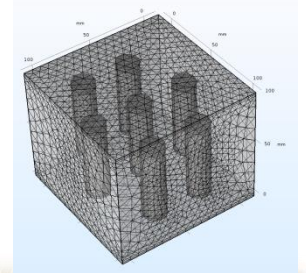
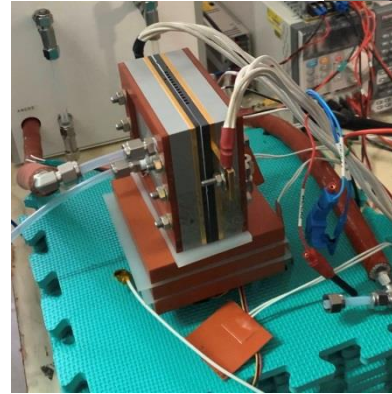
System and Control Lab.



Researches

Development of energy conservation technologies on:

- ❑ Refrigeration & air-conditioning techniques.
- ❑ Precision machinery and machining techniques.
- ❑ Efficient and low-pollution electric vehicles.
- ❑ Green energy and applications.





丁慶華 教授 Professor Ching-Hua Ting, PhD.

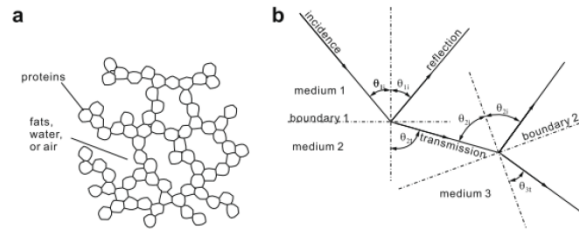
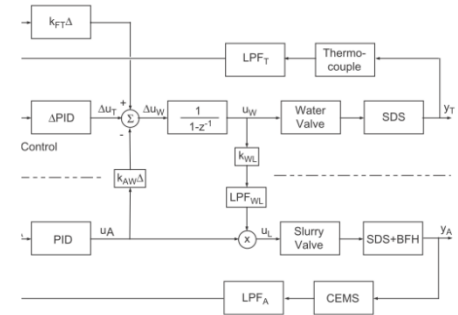
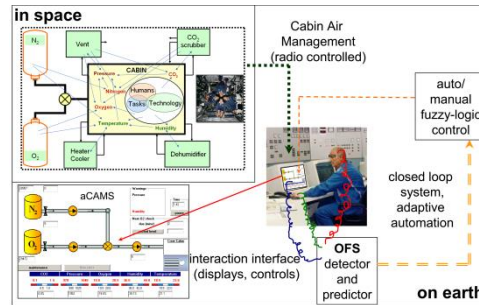
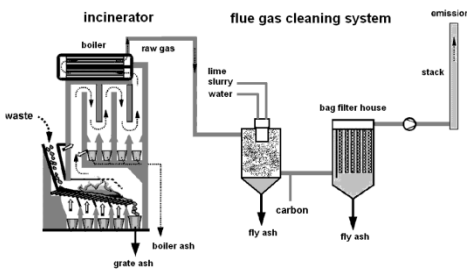
Research Area: Systems Engineering, Automatic Control

Tel: 886-271-7642, E-mail: cting@mail.ncyu.edu.tw

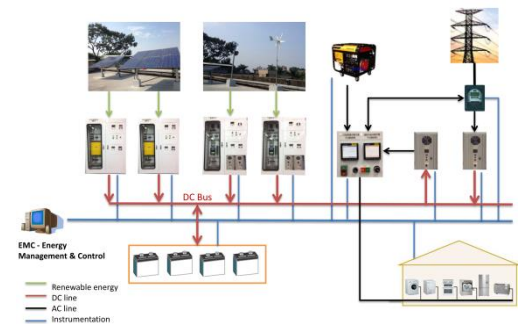
Systems engineering in:

(I) Food processing and biomedical and biological systems

(II) Mechatronics, automation, instrumentation, hydropower, and green energy



$$\beta_{tk} = \frac{4Z_k Z_{k+1} \cos \theta_{ki} \cos \theta_{(k+1)t}}{(Z_{k+1} \cos \theta_{ki} + Z_k \cos \theta_{(k+1)t})^2} \prod_{n=1}^{k-1} \beta_{tn}$$





陳榮洪 教授 Professor Rong-Horng Chen PD

Research area: Internal Combustion; Energy Application;
Liquid Drops Dynamics

Tel: 886-5-271-7562 E-mail: chenrh@mail.ncyu.edu.tw

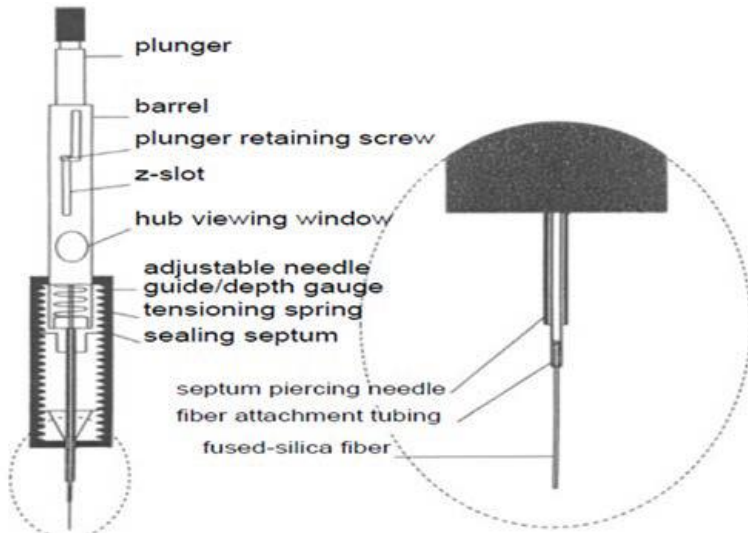
Research Interests

- alternate Fuel Engine
- Emissions Control
- Solar Cars
- Liquid Drops Dynamics



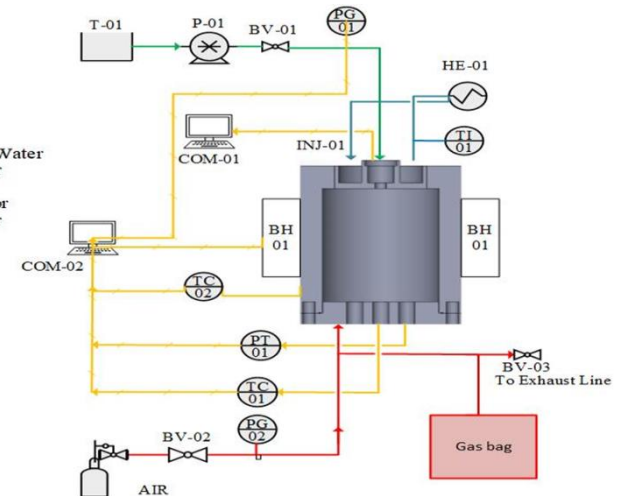
Diesel-Ethanol $We=71.2 \times \approx 0.41$
Stretching Separation

Eco-car Design



Solid phase microextraction

- PG-01: Fuel Pressure Indicator
 - PT-01: Fuel Pressure Transducer
 - HE-01: Injector Cooling System
 - TI-01: Temperature Indicator Cooling Water
 - TC-01: Thermocouple- Inside Chamber
 - TC-02: Thermocouple- Wall Chamber
 - PG-01: Fuel Injection Pressure Indicator
 - PG-02: Air Injection Pressure Indicator
 - BV-02: Inlet Gas Operating Valve
 - BV-03: Pressure Regulating Valve
 - P-01: Pump
 - T-01: Fuel Vessel
 - BH-01: Band heater Chamber
 - INJ-01: Fuel Injector
 - COM-01: Signal Generator
 - COM-02: Computer and DAQ
- Legend:
- Control line
 - Gas line
 - Coolant line



Constant Volume Combustion Chamber



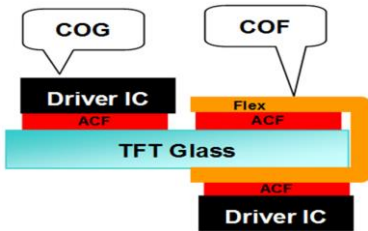
林肇民 教授 Professor Chao-Ming Lin, PhD.

Research Area: Processing, Manufacturing, Design, Solid Mechanics

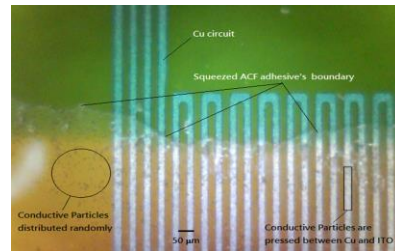
Tel: +886-5-271-7563, E-mail: cmlin@mail.ncyu.edu.tw

Research Interests:

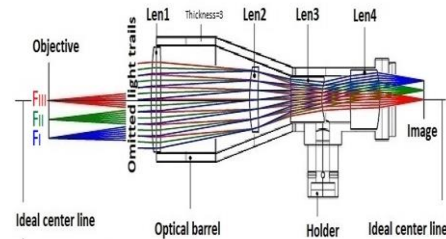
Mold Design, Polymer Processing, Optical Design, Biomedical Engineering



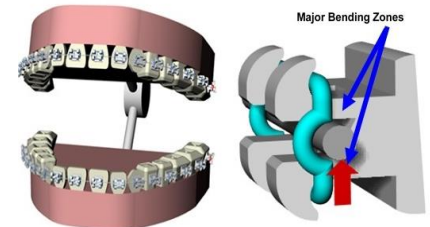
ACF: Bonding Processing



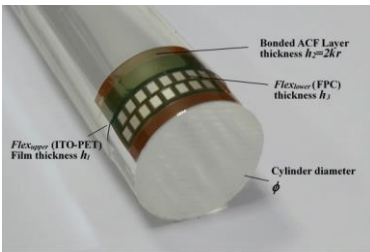
ACF: FOF Microscope image



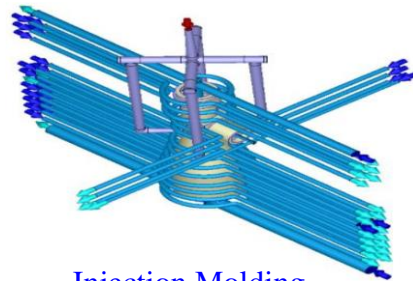
Optical Lens Design & Analysis



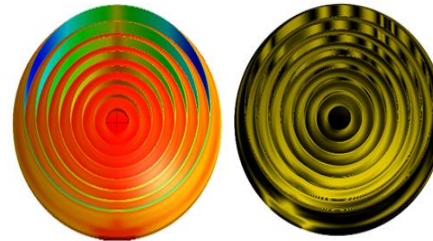
MIM: Orthodontic Braces



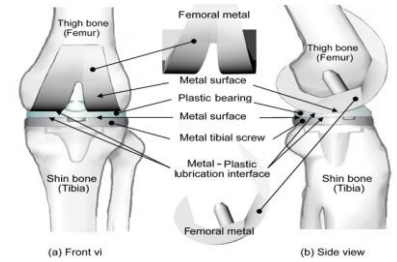
ACF: Flex-On-Flex Bonding



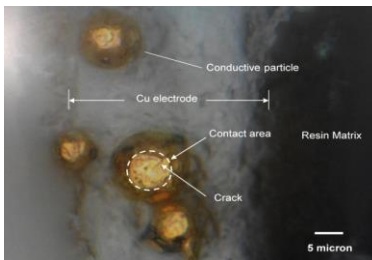
Injection Molding



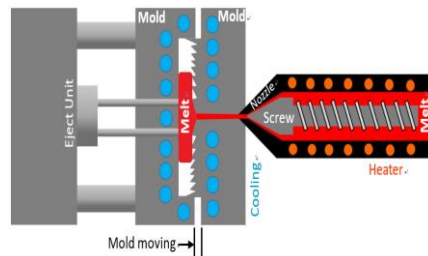
IM / ICM: Fresnel Lens



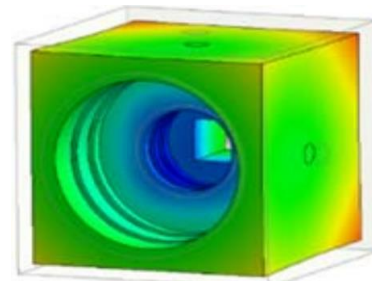
MIM: artificial knee joints



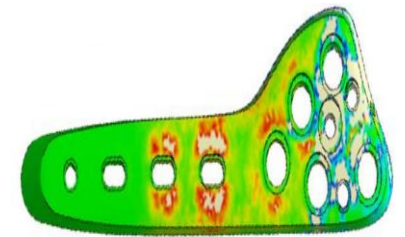
ACF: Particles & Matrix



Injection Compression Molding



Optical Frame: Design & Analysis



MIM: Bone Plate

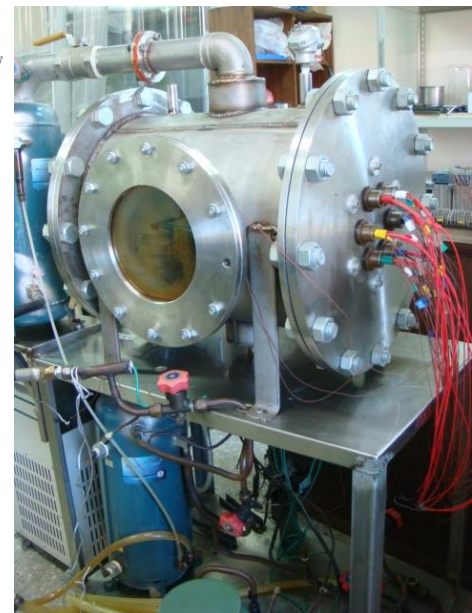
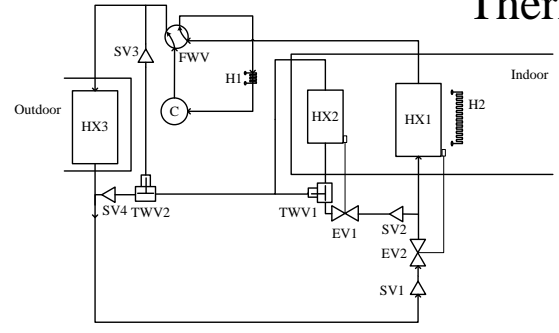
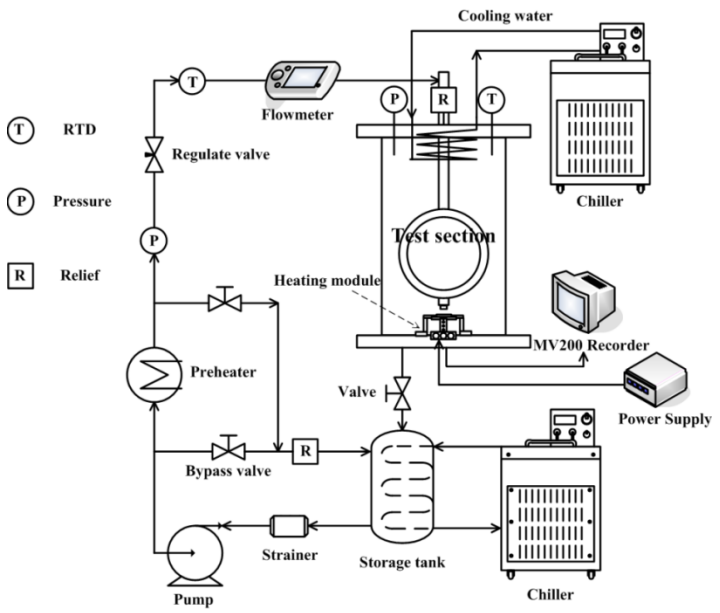


張炯堡 教授 Professor Tong-Bou Chang PhD

Research area: **Refrigeration & Air-Conditioning; Energy Saving; High Efficiency Heat Transfer**

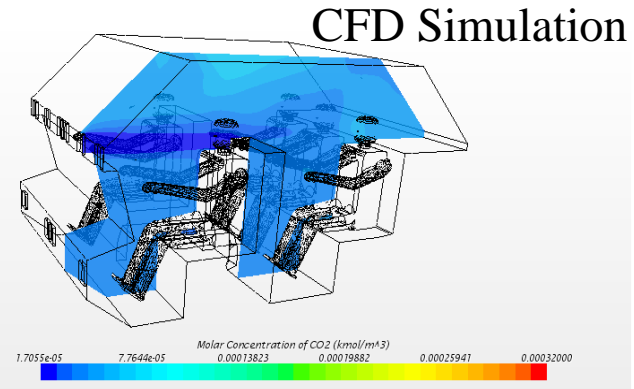
Tel: 886-5-271-7565 E-mail: tbchang@mail.ncyu.edu.tw

Thermal Management for EVs



High Efficiency Heat Transfer

- Spray cooling
- Nanofluids heat transfer





翁永進 教授 Professor **Yung-Jin Weng, Ph.D**
Research Area: Design and Manufacturing, Polymer processing
 Tel: 886-271-7564,
 E-mail: yjweng@mail.ncyu.edu.tw

Research Interests:

Microfabrication,
 Nanoimprint Lithography,
 Microstructures of Polymers,
 Precise & Innovative Plastic
 Molding Technologies,
 MEMS, TRIZ, Micro/Nano
 Fabrication Technologies
 Integrating.

PRECISION MACHINING/ NANOIMPRINT LITHOGRAPHY

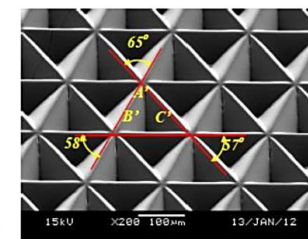
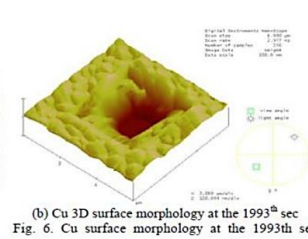
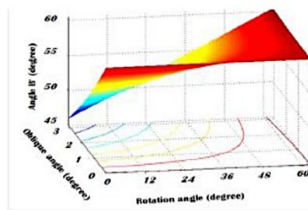
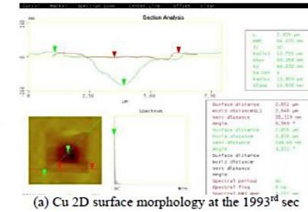
Roll to Plate FLEXIBLE NANOIMPRINT

Fresnel lens Microstructure Replication

Equipments of the micro transfer imprinting system using roller with magnetic fluid bag

Visual Imaging

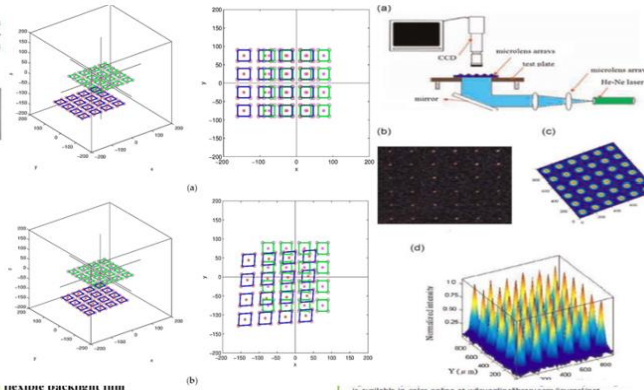
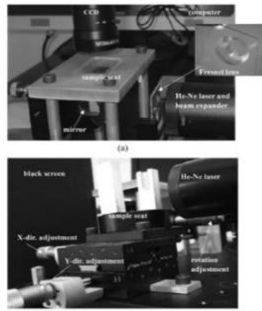
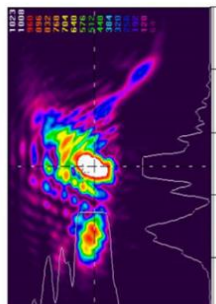
Back image Front image



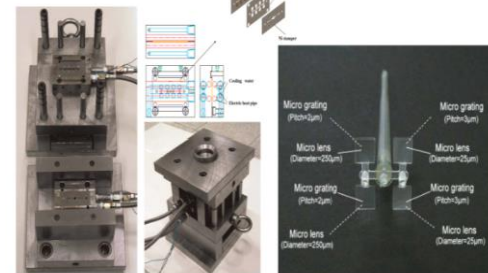
ADVANCED MICRO-MOLDING TECHNOLOGY / FLEXIBLE OPTOELECTRONICS

損失與光擴散分析實驗

Discussions on Optical Characteristics
 In this study, two optical systems were established, an optics inspections systems for reflective lens, which is connected to a screen for imaging by CCD, and the other is an



MICRO-MOLDING PROCESS / CNC PROCESS/ TRIZ



The photo of the mold for molding ultra-thin parts with micro-features on both surfaces and three-view drawing for the micro-mold design of ultra-thin parts with micro-features on both surfaces.





吳佳璟 助理教授 Assistant Professor Joe, Chia-Chin Wu, Ph.D.

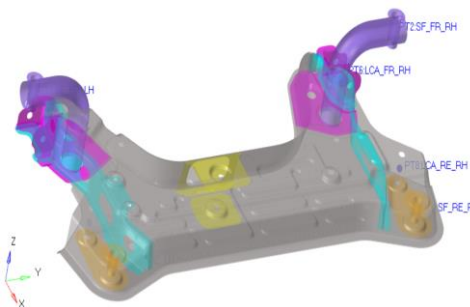
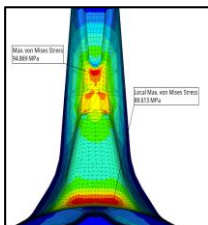
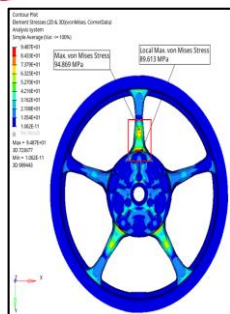
Tel: 886-5-271-7566 e-Mail: joechia-chin.wu@mail.ncyu.edu.tw

Research Field: Structural Vibration, Finite Element Analysis, Vehicle Dynamics, Fatigue Life Analysis, Structural Optimization

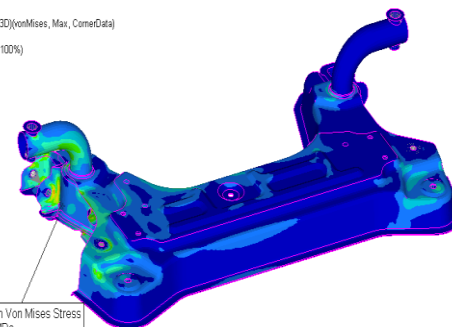
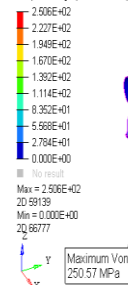
Interest: Design and Development of Vehicle Structural Components



宏佳騰動力科技股份有限公司
AEONMOTOR.CO.,LTD.



Contour Plot
Element Stresses (2D & 3D)(vonMises, Max, CornerData)
Analysis system
Simple Average (Var. <= 100%)



RW 正道工業
RIGHTWAY

- Use FEA to evaluate wheel strength;
- DV test conducted for validation.
- Wheel already used on e-bike Ai-3 Comfort

- Original subframe made by stamped steel
- FEA used to evaluate the strength
- Topology optimization used to find effective material distribution for future design of gravity casting subframe.



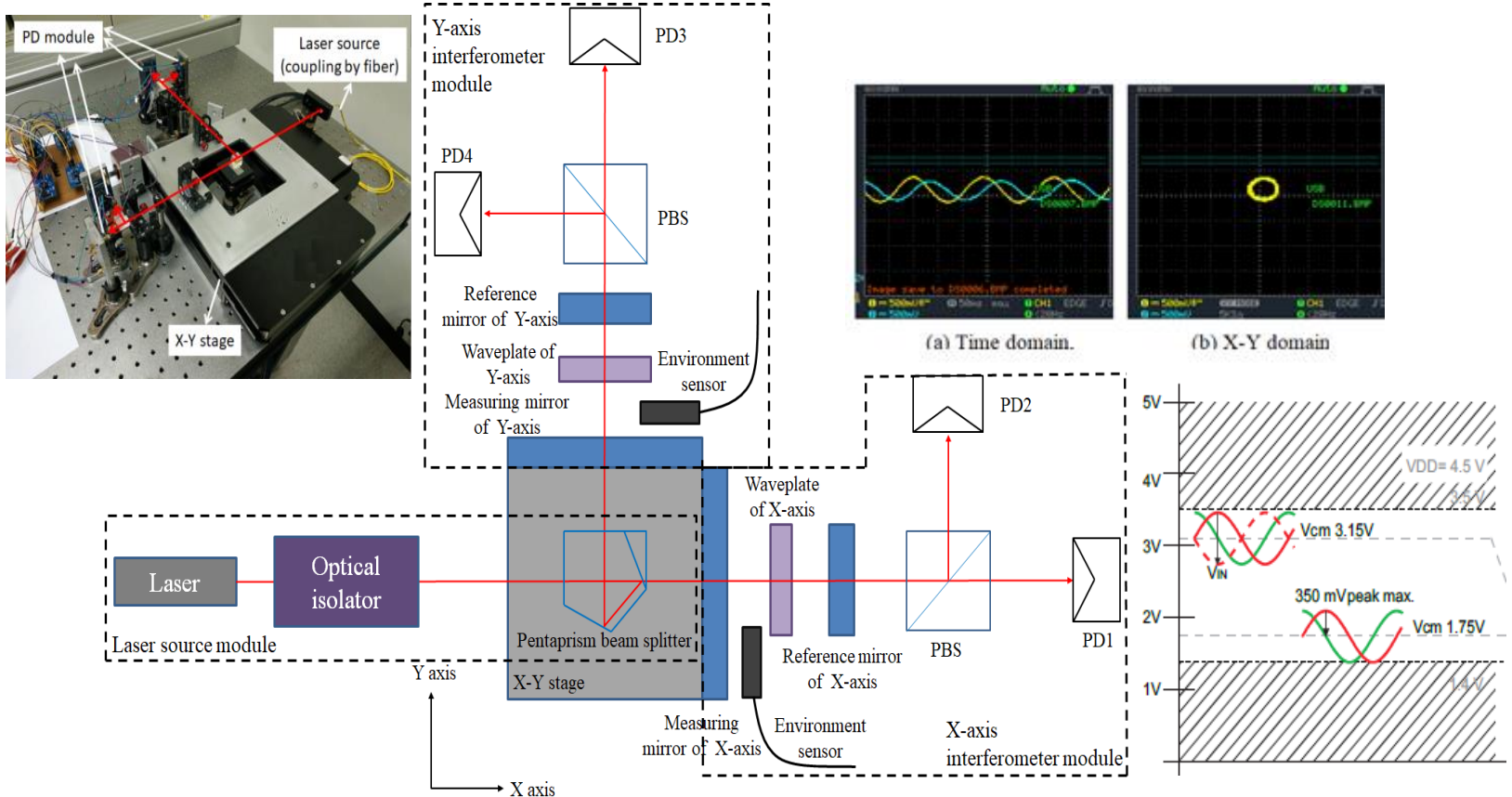
張中平 助理教授 Assistant Professor **Chung-Ping Chang**, Ph.D

Research Area: Opto-Electrical Measurement, Laser interferometric technology

Tel: 886-271-7643, E-mail: cpchang@mail.ncyu.edu.tw

Research Interests:

1. Development of the high precision positioning technology by using the opto-electrical theory.
2. Design the measurement and positioning system for industrial purposes.





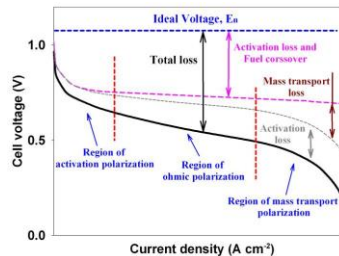
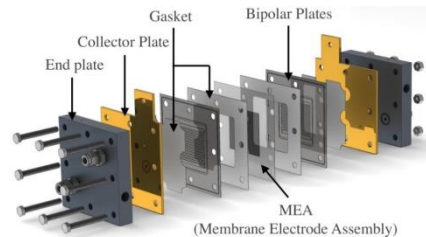
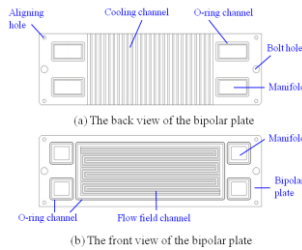
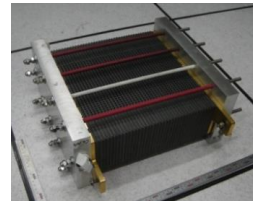
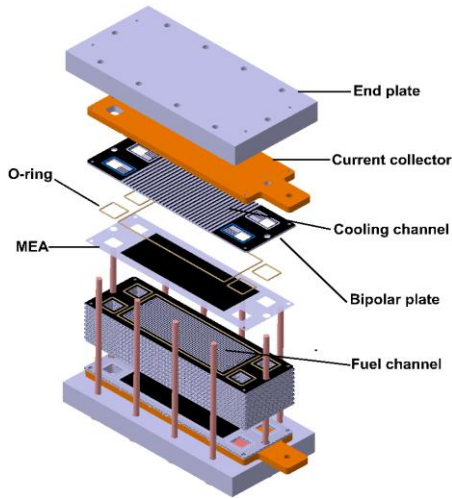
陳震宇 助理教授 Assistant Professor **Chen-Yu Chen**

Research Area: Fuel Cell, Hydrogen Energy, Thermal Analysis

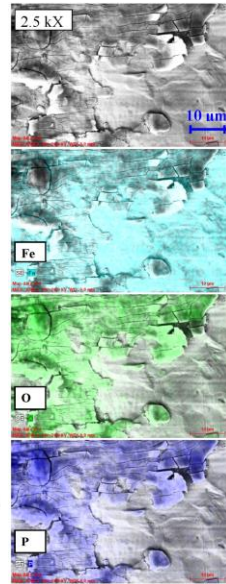
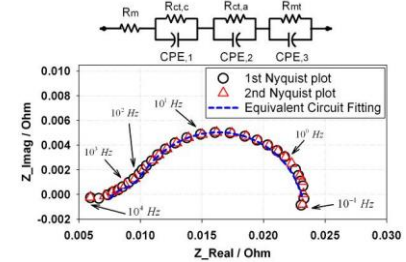
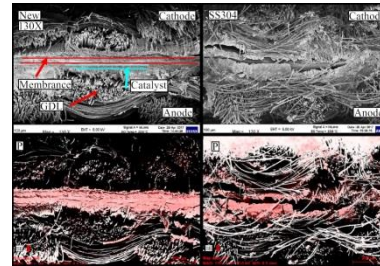
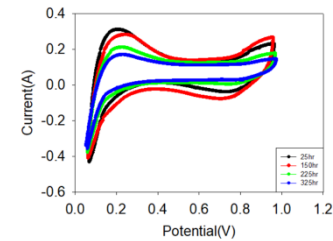
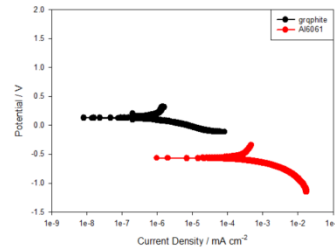
Tel: +886-5-271-7568, E-mail: chenychen@mail.ncyu.edu.tw

Research Interests :

1. Development and performance analysis of kW-scale PEMFC stack, HT-PEMFC stack, and Metallic Bipolar Plate Stack.



2. Fundamental research of electrochemical characteristics of electrochemical energy systems



Selected Publications:

1. **Chen-Yu Chen**, Jian-Hao Su, Hafiz Muhammad Ali, Wei-Mon Yan*, Mohammad Amani*, *International Journal of Heat and Mass Transfer*, vol. 163, pp.120522 (8 pages), **2020**. (SCI/EI : 4.947; Mechanics : 10/136= 7.35% , **top 8%**)
2. Wei-Mon Yan, **Chen-Yu Chen*** and Chia-Hao Liang, *Energy*, vol.186, pp.115836 (9 pages), **2019**. (SCI/EI : 6.082, Thermodynamics : 3/61= 4.9% , **top 5%**)
3. **Chen-Yu Chen*** and Sheng-Chun Su, *Energy*, vol.159, pp.440-447, **2018**. SCI/EI : 5.537, Thermodynamics : 3/60= 5% , **top 5%**).
4. **Chen-Yu Chen*** and Sheng-Chun Su, *International Journal of Hydrogen Energy*, vol. 43(29), pp.13430-13439, **2018**. (SCI/EI : 4.084, Energy and Fuels : 31/103= **30.1%**)

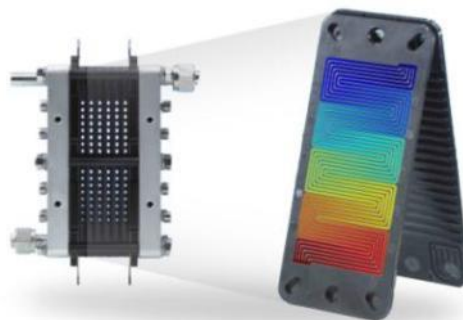
Facilities & Equipments (Prof. Chen-Yu Chen)



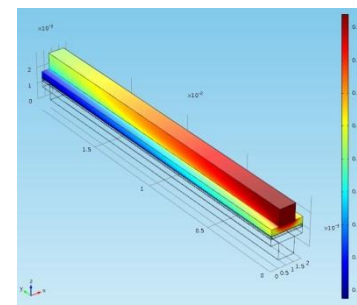
FC test station



Bubbling type humidifier



Multiphysics Software -COMSOL



Battery test station



DAQ system



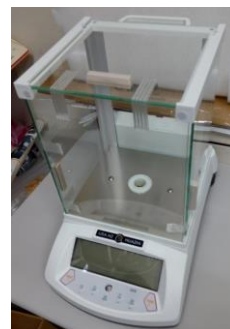
Potentiostat / FRA



FC test station



MFC



Scale



E-Load



College of Science & Engineering



WELCOME to NCYU!!