



# *National Chiayi University*

## **Department of Applied Chemistry**



Introduction by Prof. Yu-Jang Li

# Department of Applied Chemistry at NCYU

- faculty members: 18
  - Professor: 11
  - Associate Professor: 3
  - Assistant Professor: 2+2
- students: under: 172
  - master: 28, Ph.D.: 7





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應化二館

# Facilities & Instruments



**TEM**



**GC-Mass**



**CD-ORD**



**Electron Microscope**



**LCMS**



**FT-IR**



**300 MHz NMR**



**400 MHz NMR**



**X-Ray Diffractometer**



陳文龍 教授 Professor **Wenlung Chen**, PhD.

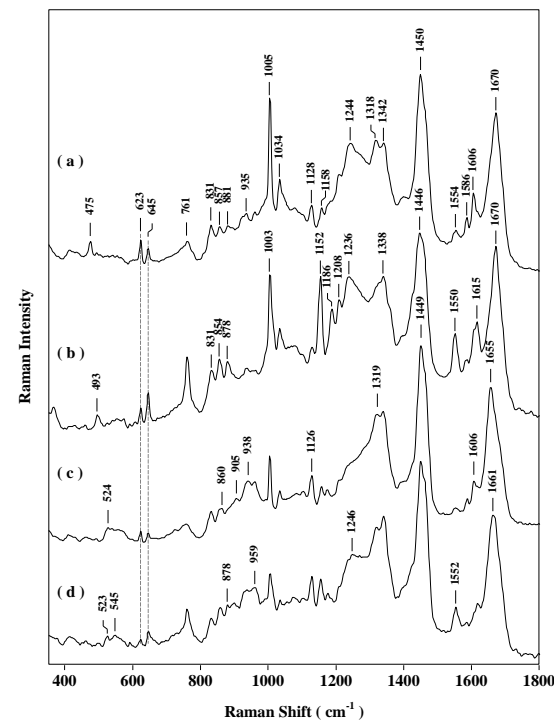
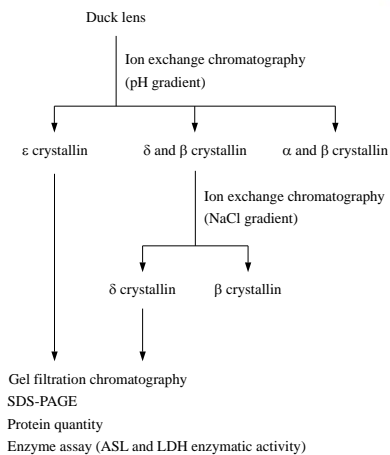
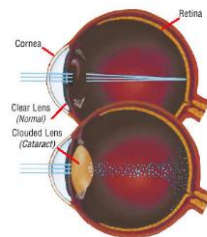
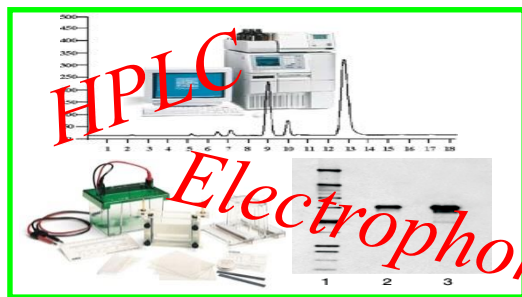
**Research Area:** Analytical Chemistry , Biophysical Chemistry

Tel: [886-271-7965](tel:886-271-7965), E-mail: [wlchen@mail.ncyu.edu.tw](mailto:wlchen@mail.ncyu.edu.tw)

Development of Raman techniques in biochemical and biomedical applications:

(I) Compositions, Antioxidants, and Spectral Analysis of Natural Products

(II) Structural Characterization of Protein-Protein Interactions





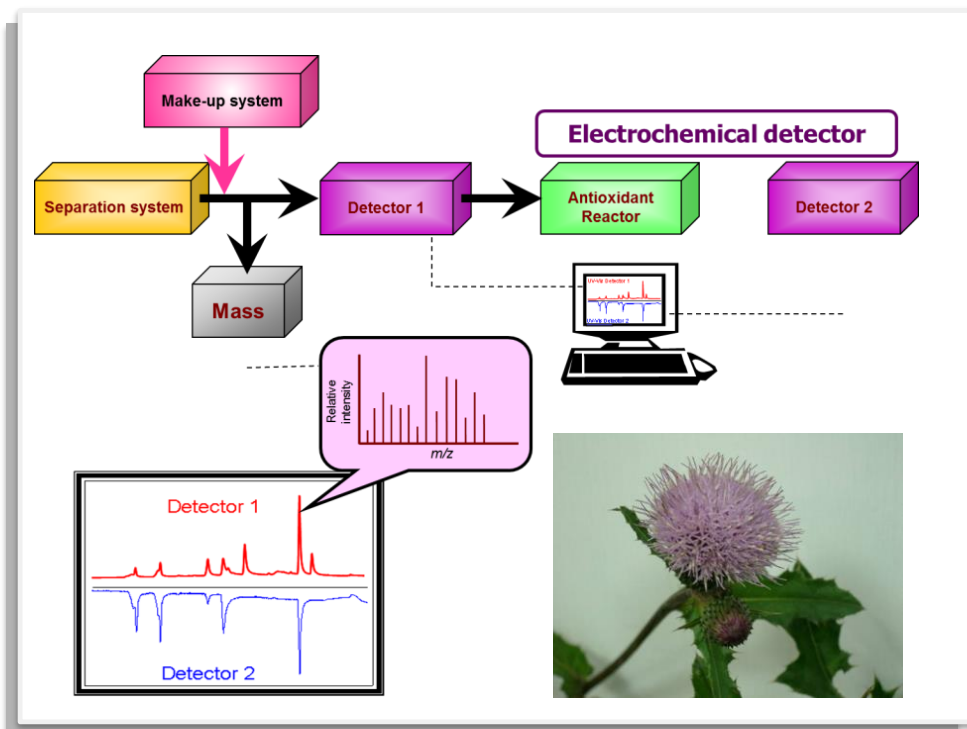
古國隆 教授 Professor **Kuo-Lung Ku**, Ph.D

**Research Area:** Analytical Chemistry, LC-UV-ECD-MS

Tel: 886-271-7405, E-mail: klku@mail.ncyu.edu.tw

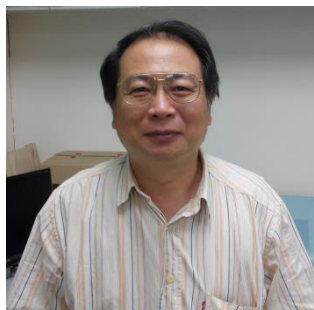
## Research Interests:

Integrating LC, electrochemical analysis, mass spectrometry for studying natural products.



## Developing

- 1. Signal-Ratio-Based Antioxidant Index system**
- 2. Electrochemical recovery and detection technique** for probing activities and structures of plant secondary metabolites, peptides, and other natural products

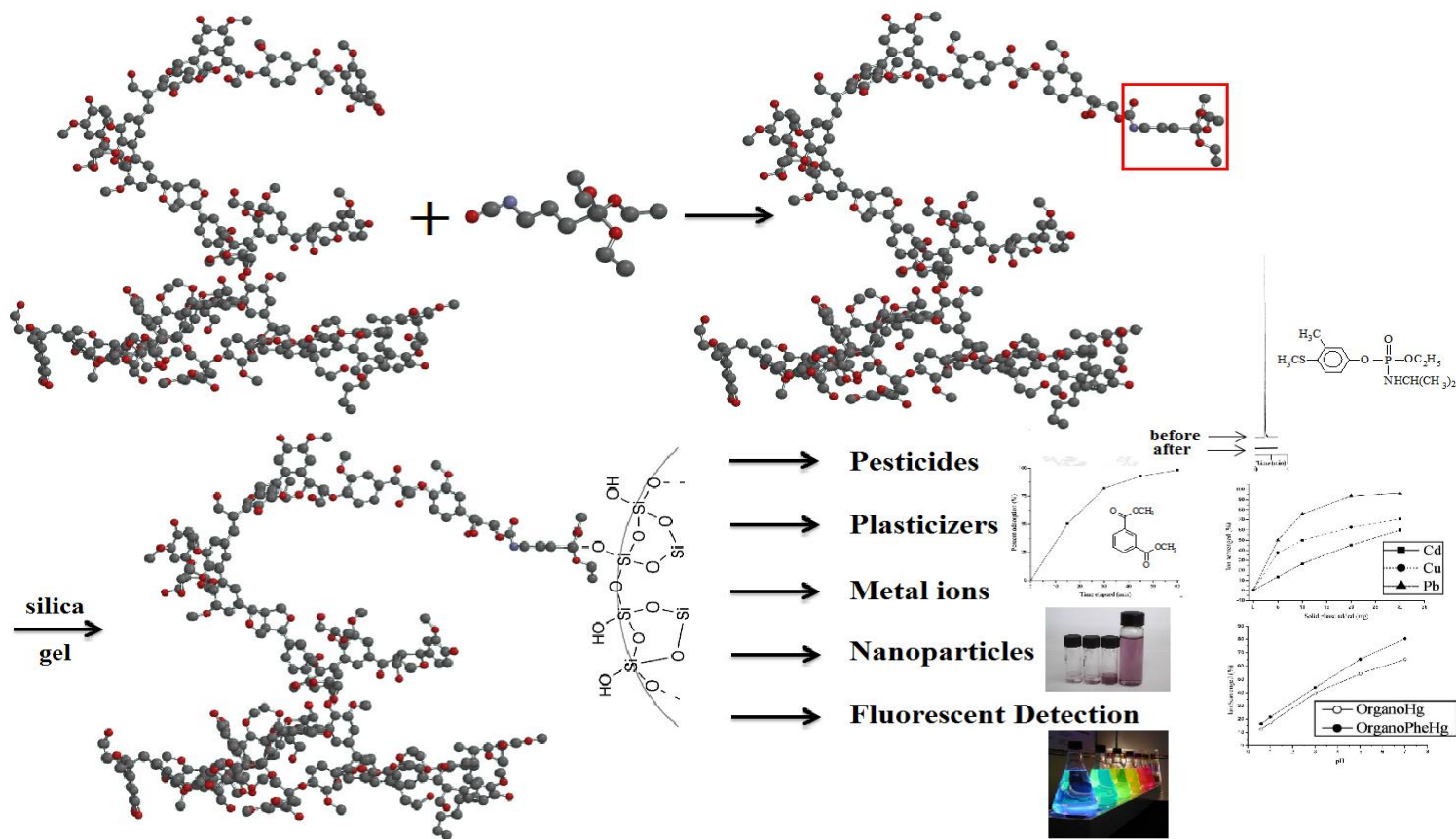


陳世晞 教授 Professor **Shushi Chen**, Ph.D.

**Research Area:** Analytical Chemistry

Tel: 886-271-7997, E-mail: schenphd@mail.ncyu.edu.tw

## A Multipurpose Lignin-Based Adsorbent for Metallic Ions, Nanoparticles and Various Organophosphate Pesticides in Hexane





連經憶 助理教授 Assistant Professor

**Ching-yi Lien, Ph.D**

**Research Area:** Analytical Chemistry, Nanoanalysis

Tel: 886-271-7963, E-mail: kelly@mail.ncyu.edu.tw

**Research Interests:**

Peptide  
Synthesis  
Identification  
Purification

+

Green synthesis  
Gold Nanoparticles  
Identification  
Purification



Peptide-capped gold  
nanoparticles  
Biological Activities

Cosmetic ingredients/products development

- Wild yam
- Orchid
- *Zingiber zerumbet* (Shampoo ginger, pinecone ginger)

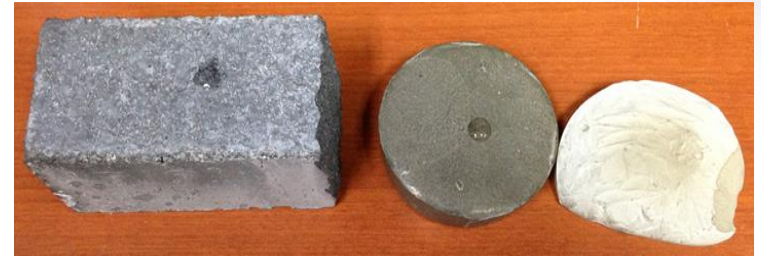
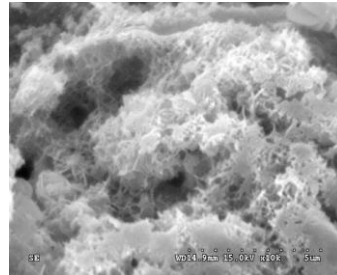




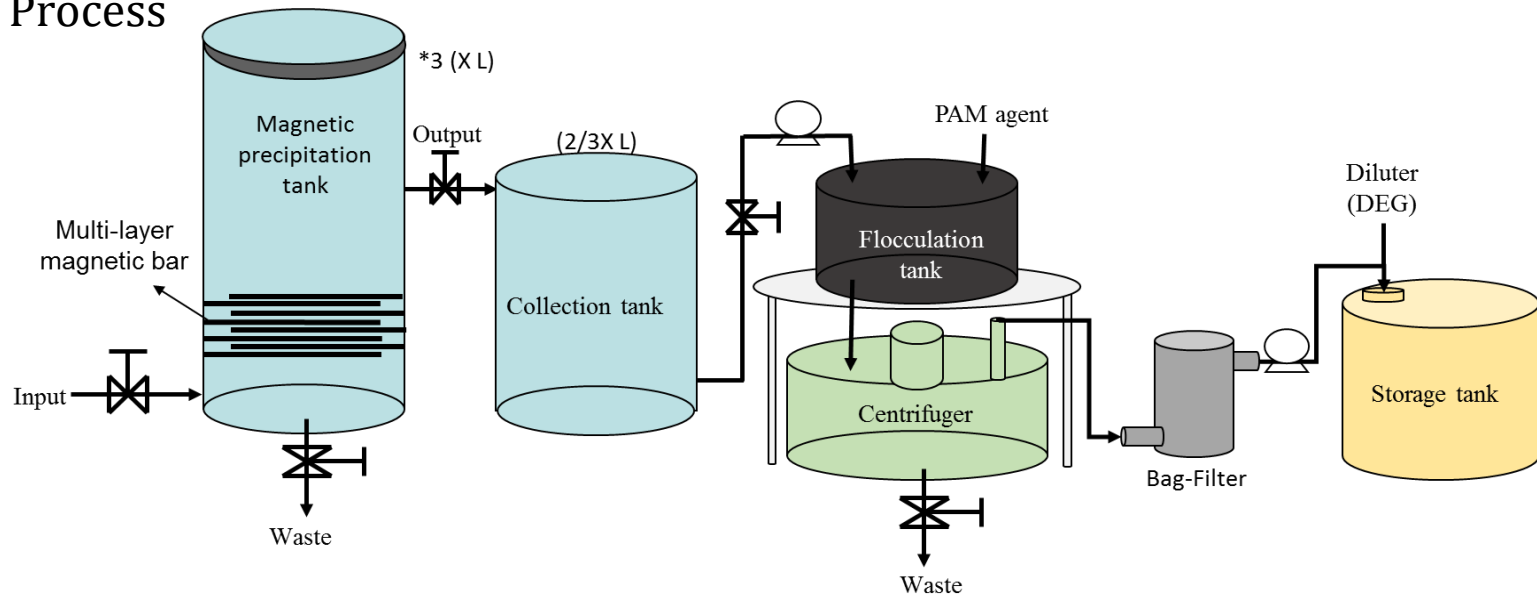


李茂田 教授 Professor **Maw-Tien Lee, PhD**  
**Research Area:** Environment-Benign Materials  
Tel: 886-271-7691, E-mail: mtle@mail.ncyu.edu.tw

## 1. Hydrophobic rubcrete development



## 2. Improved Cutting Slurry Regeneration Scheme for the Chip Manufacturing Process

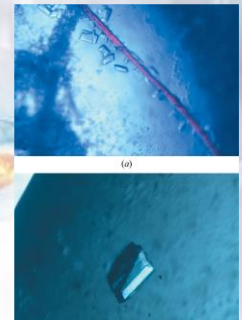




林榮流 教授 Professor Long-Liu Lin, Ph.D.

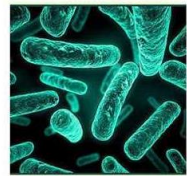
Research Area: Biochemistry; Microbial Biotechnology

Tel: 886-271-7969, E-mail: llin@mail.ncyu.edu.tw

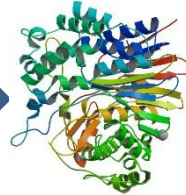


## Research Interests:

### 1. Structure-function studies of microbial enzymes

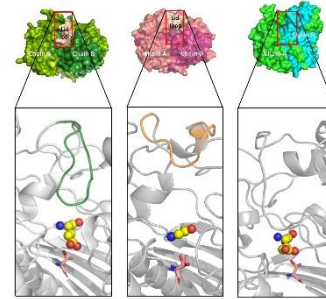


Enzyme purification & structural determination

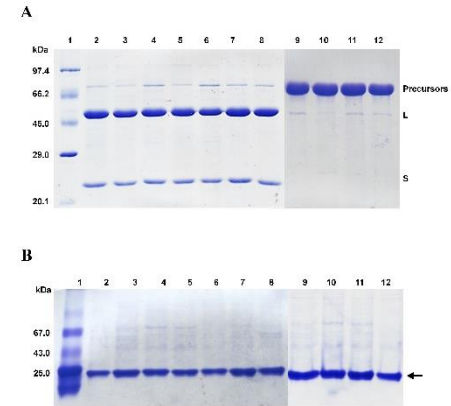


4OTT

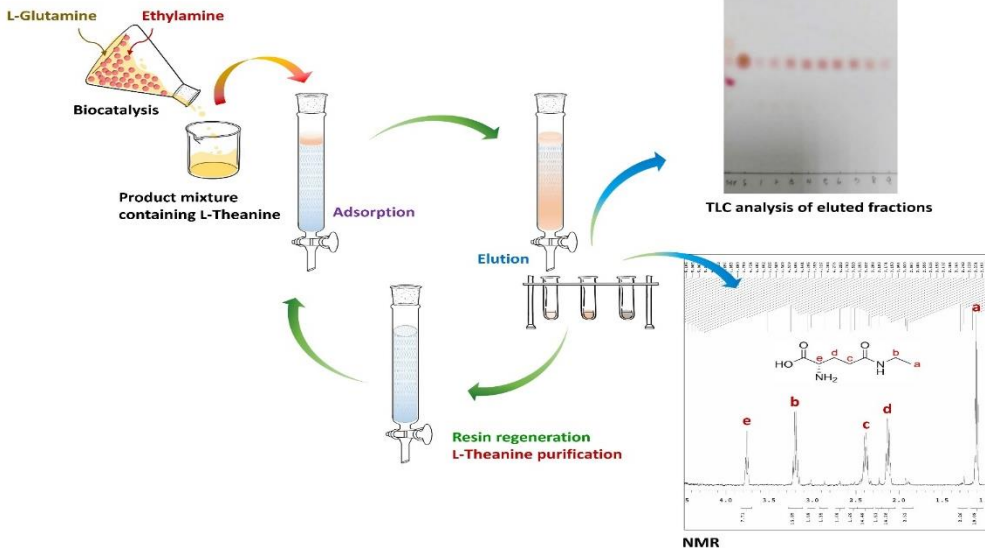
Structural comparison



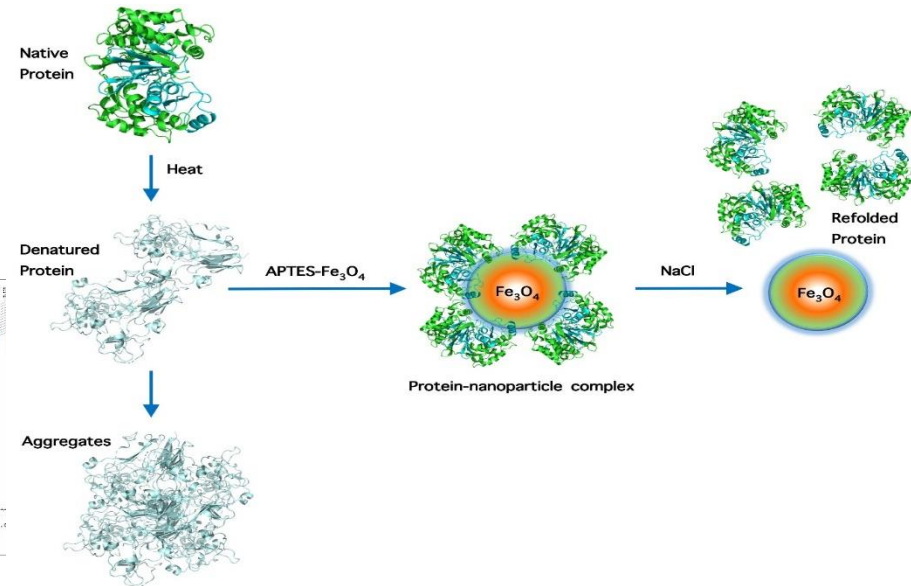
Mutagenesis



### 2. Biocatalytic synthesis of phytochemicals



### 3. Refolding of heat-denatured proteins by metal oxides





鄭建中 教授 Professor Chien-Chung Cheng, PhD.

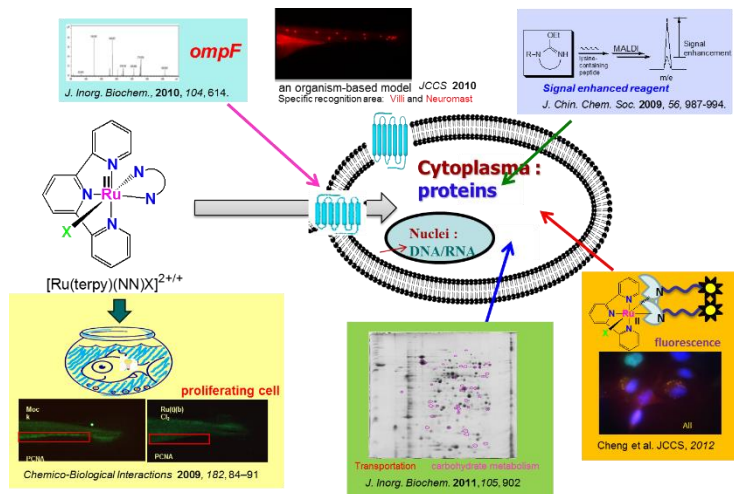
Research Area: Bio-Organic and Bio-Inorganic Chemistry

Tel: 886-5-2766084, E-mail: cccheng@mail.ncyu.edu.tw

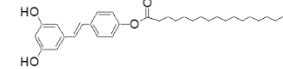
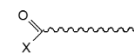
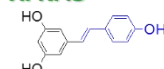
## Research Interests

1. To study the relationship between bio-molecules structures and their functions;

2. To develop chemical tools for cell transportation

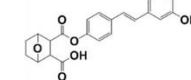
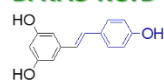


### A. RMS



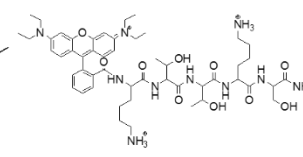
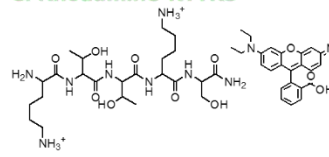
Natural product as modified amphiphiles  
Metastable/drug release

### B. RMS-NCTD



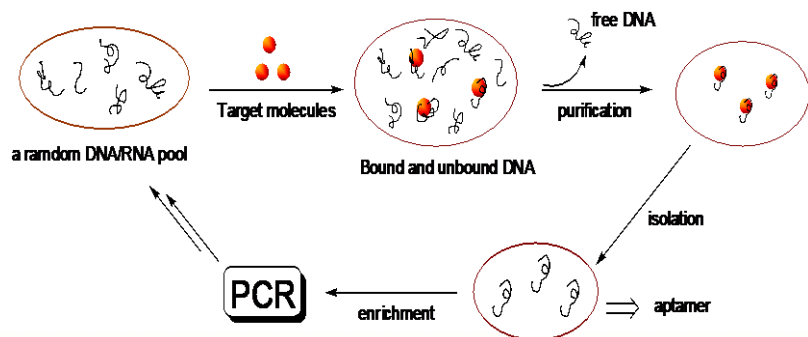
Amphiphile formed by two drugs, increased efficiency

### C. Rhodamine-KTTKS

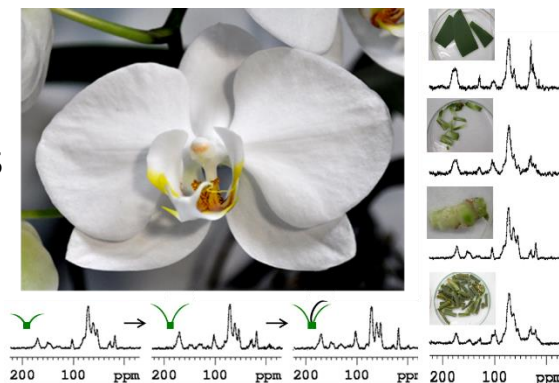


CPP Amphiphile for the depth of cell layers

3. To discover chemotherapeutic DNA drugs



4. To study the regulation factors of small molecules in plant growth



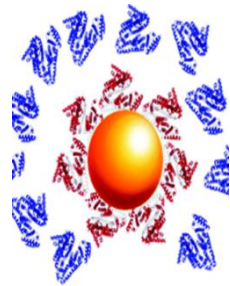


陳瑞彰 助理教授 Assistant Professor

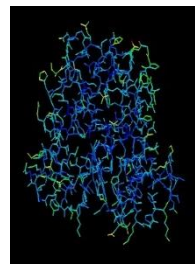
Jui-Chang Chen, Ph.D

Research Area: Biochemistry, Nanomaterials

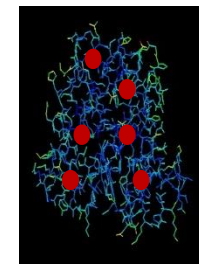
Tel: 886-271-7968, E-mail: chenjc@mail.ncyu.edu.tw



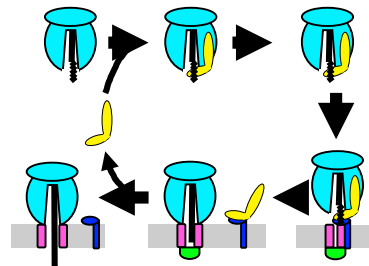
(A) binding affinities of proteins for nanoparticles



proteins



(B) synthesis of fluorescent nanoclusters with proteins



(C) Role of GTP/GDP in protein translocation

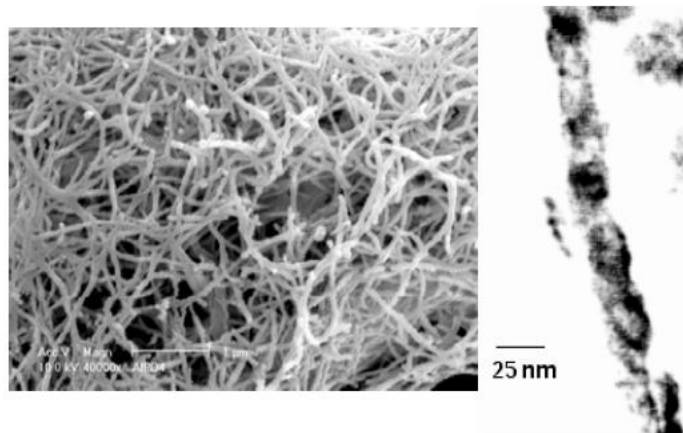
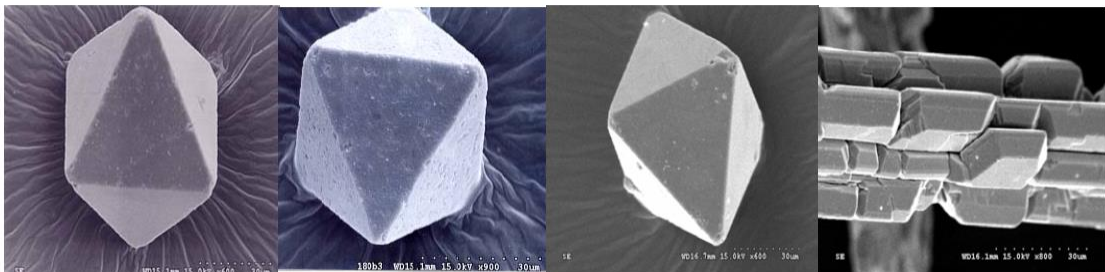
楊鐘松 教授 Professor Chung-Sung Yang PhD  
 Research area: Solid State Chemistry; Nanomaterials

Tel: 886-5-271-7962 E-mail: csyang@mail.ncyu.edu.tw

Research Interests: 研究興趣

- \*Solid State Synthesis. 固態合成:
- \*Supramolecular Molecular Nanoclusters: 超分子奈米團簇
- \*Nano- photocatalyst: 奈米光觸媒材料
- \*Porous Materials Synthesis: 微孔及中孔洞材料合成

NCYU-1 嘉大 1 號    NCYU-2 嘉大 2 號    NCYU-3 嘉大 3 號

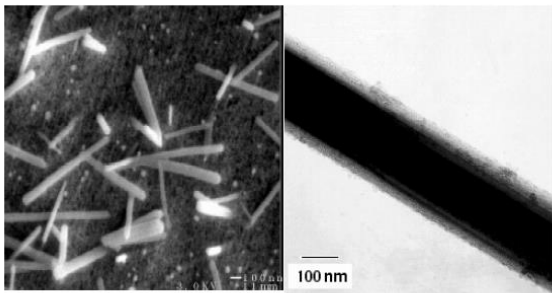


AlPO<sub>4</sub> Nanowire

TEM for AlPO<sub>4</sub>

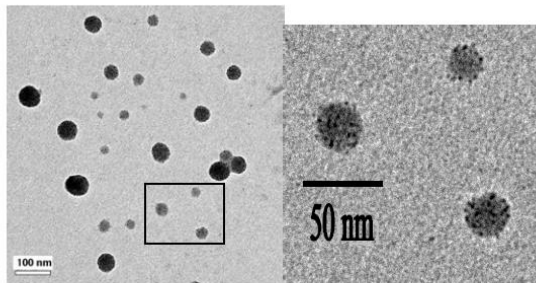


Self-assembly Cu<sub>2</sub>S

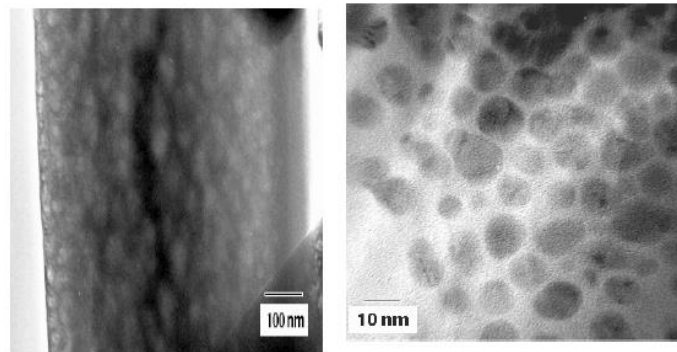


TiO<sub>2</sub> nanorods

SiO<sub>2</sub> ^ TiO<sub>2</sub> rods



Alumina doped titania (Al<sub>2</sub>O<sub>3</sub>@TiO<sub>2</sub>) nps



Mesoporous GaPO<sub>4</sub> Rod

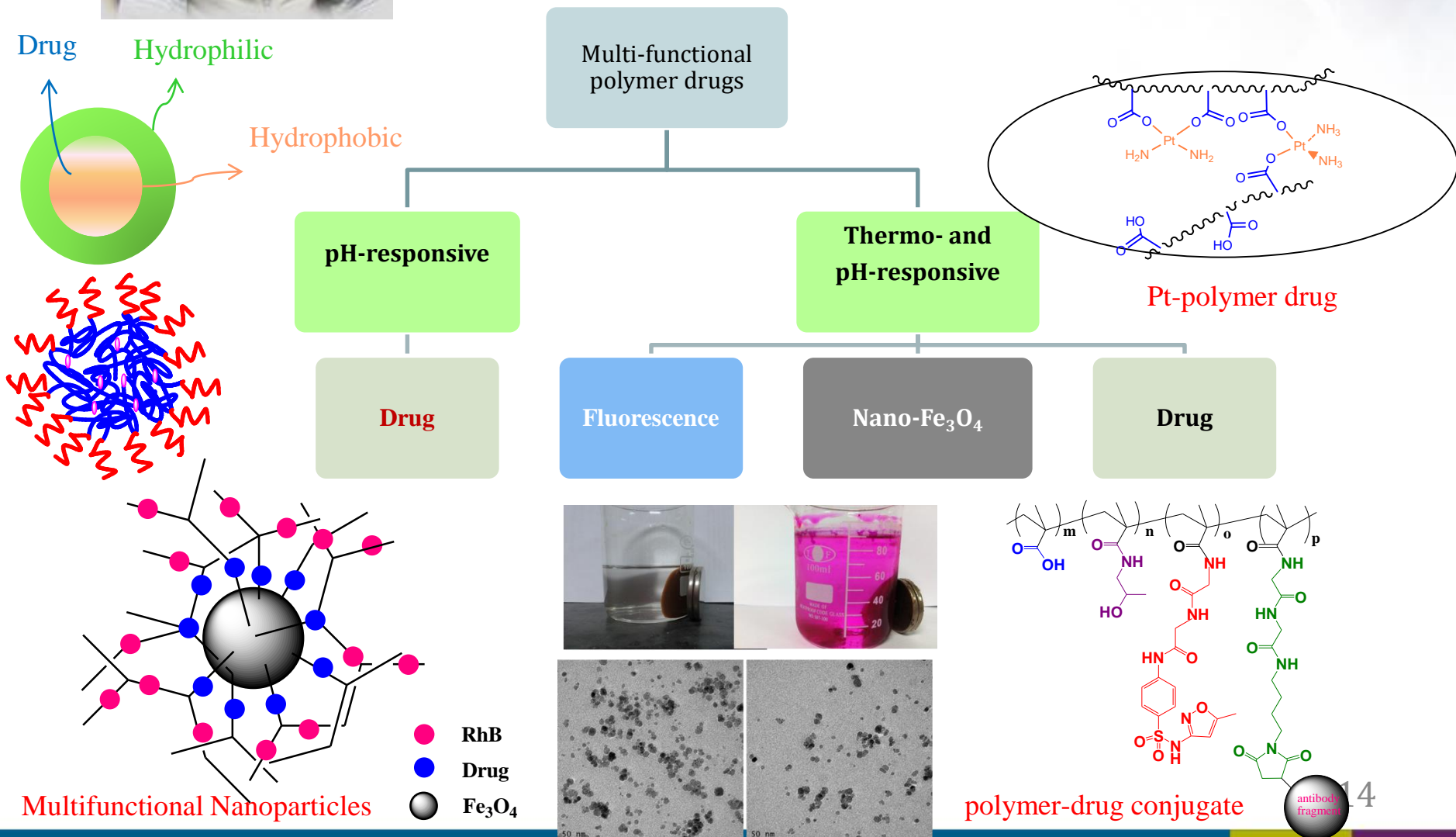
InPO<sub>4</sub> nanoparticles



梁孟 教授 Professor **Mong Liang, Ph.D**

**Research Area:** Polymer Chemistry, Catalysis

Tel: 886-271-7952, E-mail: mliang@mail.ncyu.edu.tw





邱秀貞 副教授 Associate Professor

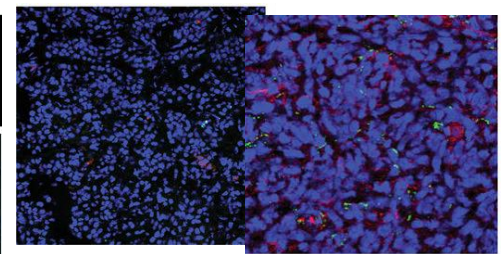
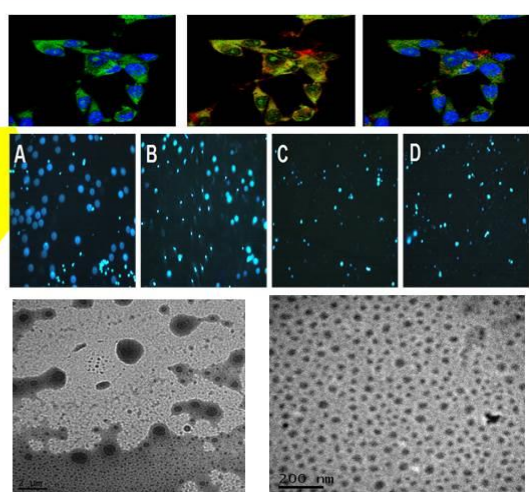
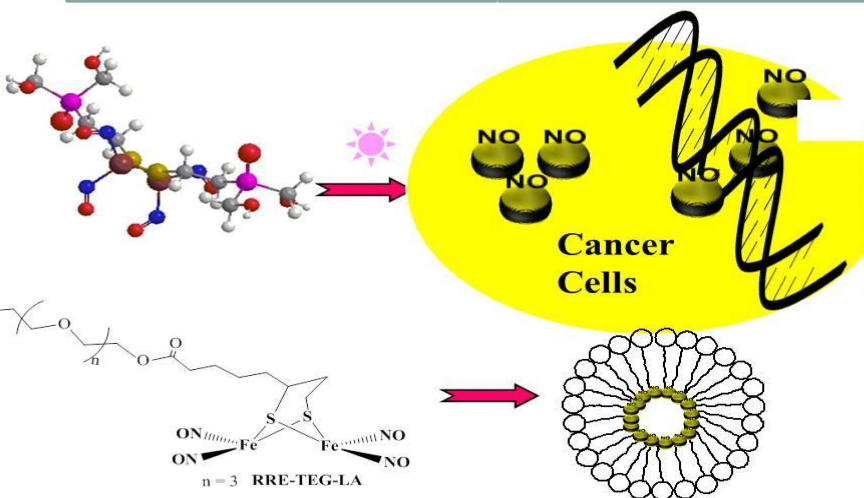
Show-Jen Chiou, Ph.D

Research Area: Bioinorganic/organicmetallic Chemistry

Metal biomedical materials

Tel: 886-271-7951, E-mail: [genechiou@mail.ncyu.edu.tw](mailto:genechiou@mail.ncyu.edu.tw)

**Research Interests**



1. *Nature Nanotechnology* **2019**, 12, 1160-1169.
2. *Inorg Chem*, **2018**, 57, 12425-12443.
3. U.S. Patent Application No. 15/413,428, January 24, **2017**.



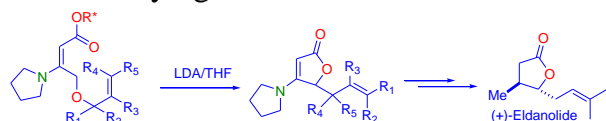
李瑜章 教授 Professor Yu-Jang Li, Ph.D.

## Research Area: Asymmetric Synthesis

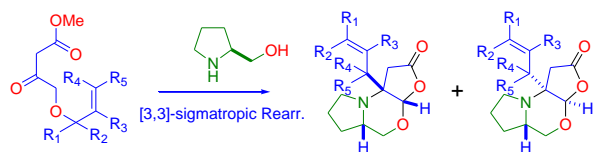


### Research Interests :

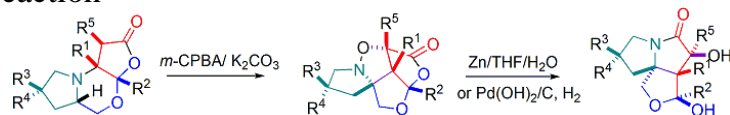
1. Chiral [2,3]-Wittig rearrangement of  $\gamma$ -allyloxy substituted vinylogous urethane enolates.



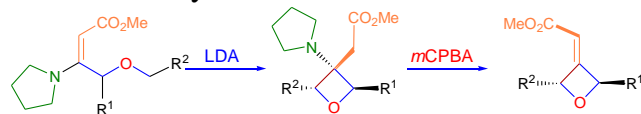
2. [3,3]/[1,3]-Claisen rearrangement of  $\gamma$ -allyloxy substituted vinylogous urethanes.



3. Tandem Cope elimination/1,3-dipolar cycloaddition reaction



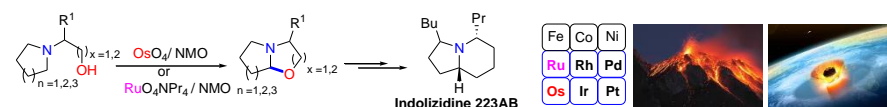
4. Synthesis of Polysubstituted Oxetanes



5. Synthesis of Biologically active Natural Product



6. OsO<sub>4</sub> and TPAP (RuO<sub>4</sub>-Pr<sub>4</sub>N<sup>+</sup>) mediated oxidative cyclization of cyclic aminoalcohols.



### Publications:

1. Total synthesis of Indolizidine Alkaloids (-)-167B, (-)-209I, and (-)-223A by Using a Common Tricyclic Lactone. Yu-Jang Li, \* Chung-Chien Hou, and Kuei-Chen Chang. *Eur. J. Org. Chem.* **2015**, 1659-1663.
2. Stereoselective Synthesis of 2,3,4-highly Substituted Oxetanes by Intramolecular C-C Bond Forming Michael Addition, Guo-Ming Ho and Yu-Jang Li\*. *Chem. Commun.* **2016**, 52, 12108-12111.
3. *anti*-Selective aldol reactions of chiral alcohol-substituted gamma-benzyloxy vinylogous urethanes and the synthesis of 3-benzyloxy-4-hydroxylalkane-2-ones. Yu-Jang Li\*, Chuan-Chung Chung, Pin-Zu Chen. *Tetrahedron: Asymmetry* **2017**, 28, 1573-1581.
4. Tandem [1,2]-Wittig Rearrangement/Lactonization of gamma-benzyloxy vinylogous urethanes: Application to the Synthetic studies of Maculactone A, Planchol C and gamma-Lycorane. Guo-Ming Ho, Yu-Jang Li\*. *Asian J. Org. Chem.* **2018**, 7, 145-149.
5. C-H Functionalization of Amino Alcohols by Osmium Tetroxide/NMO or TPAP/NMO: Protection Group-Free Synthesis of Indolizidines (-)-223AB and 3-epi-(-)-223AB. Wei-Lun Chen, Lee-Ya Wang, Yu-Jang Li\*. *Eur. J. Org. Chem.* **2020**, 103-107.





陳清玉 副教授 Associate Professor

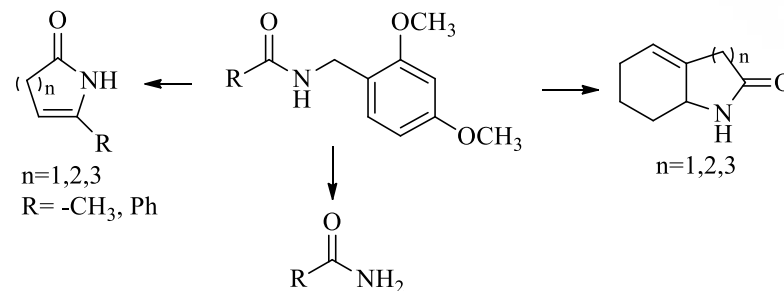
Ching-Yuh Chern, Ph.D

Research Area: Organic Chemistry, Synthesis Methodology and Mechanism

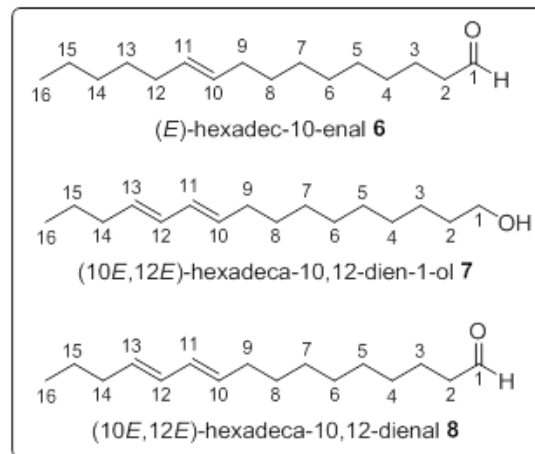
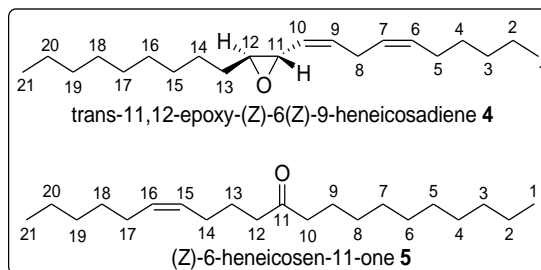
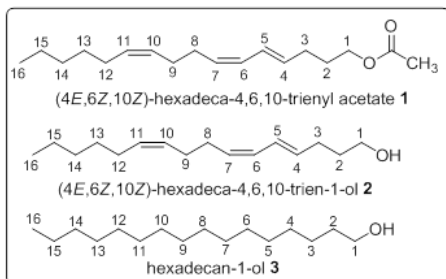
Tel: 886-271-7970, E-mail: cychern@mail.ncyu.edu.tw

## Research Interests :

1. Employ different method to develop new synthesis methodology and mechanism study.



## 2. Synthesis of sex pheromone of insects





黃建智 副教授 Associate Professor

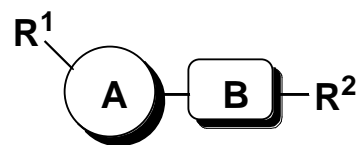
Jiann-Jyh Huang, Ph.D

Research Area: Medicinal Chemistry

Tel: 886-271-7959, E-mail: lukehuang@mail.ncyu.edu.tw

## Research Interests :

### 1. Discovery of New Anti-Cancer Drug for Brain Cancer



1

lead compound

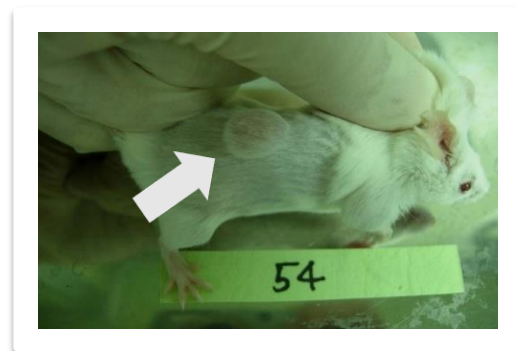
IC<sub>50</sub>: 0.10-1.29 μM

M.w. ~200 Dalton

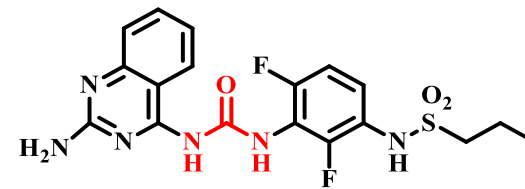
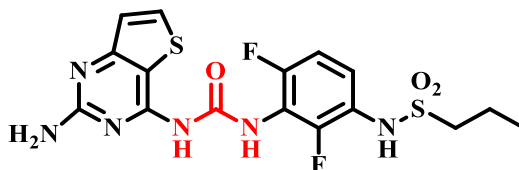
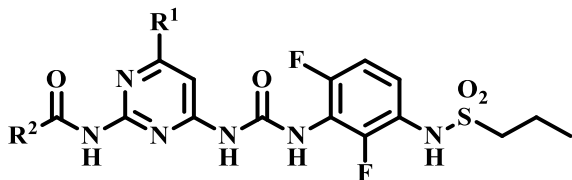
optimization

preclinical candidate

1. in vitro IC<sub>50</sub> < 20 nM
2. good PK
3. BBB permeability
4. in vivo (1 - T/C)% > 60%



### 2. Novel B-Raf Inhibitors (Me-Too and Me-Better Approach)





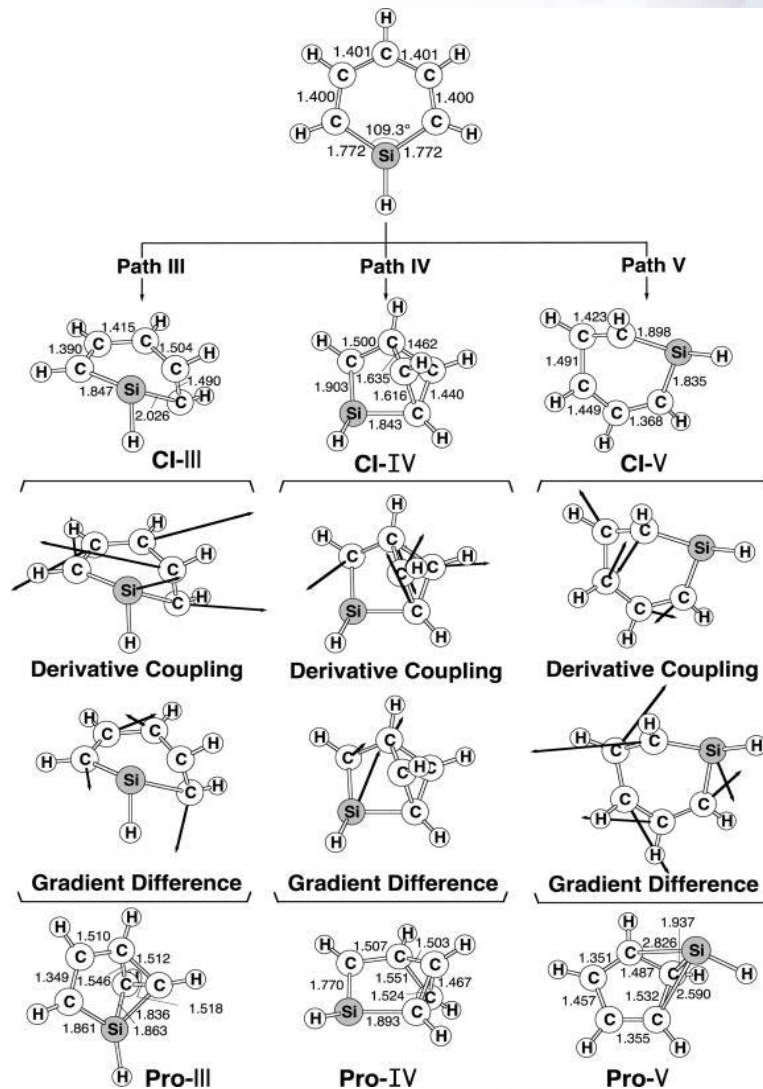
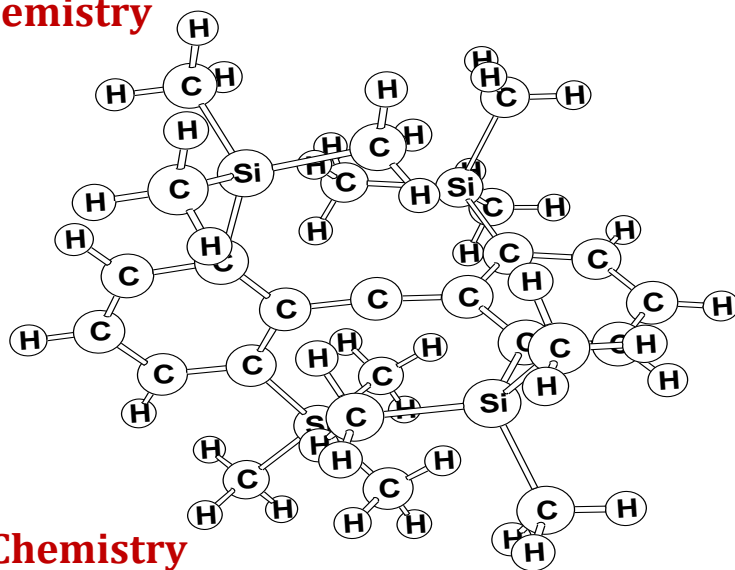
蘇明德 教授 Professor **Ming-Der Su, Ph.D**

**Research Area:** Theoretical Chemistry

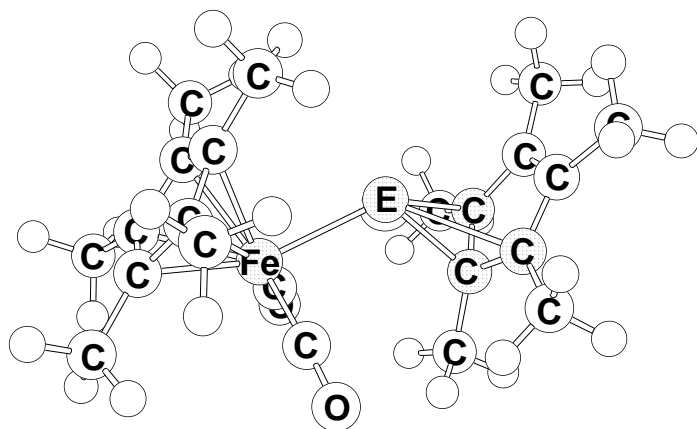
Tel: 886-271-7964, E-mail: midesu@mail.ncyu.edu.tw

**Research Interests:**

## (1) Organic Chemistry



## (2) Inorganic Chemistry





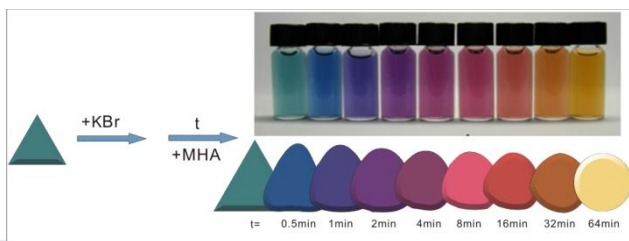
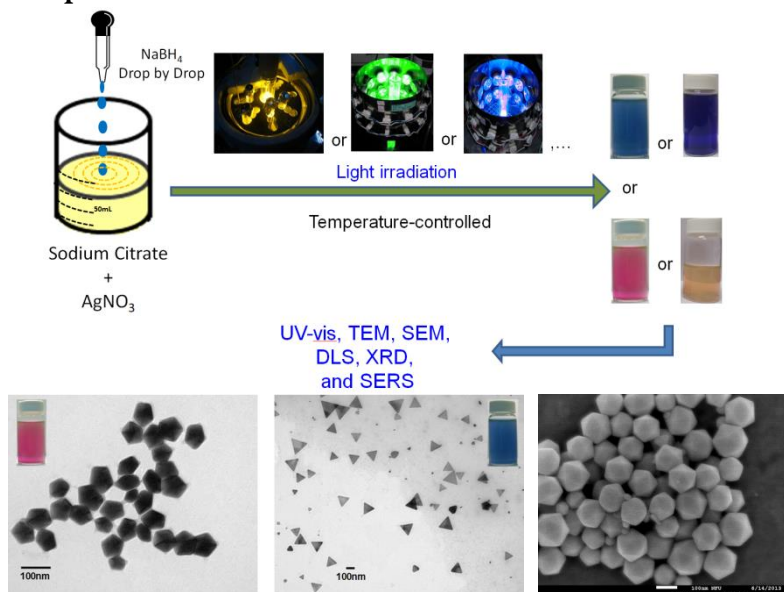
# 黃正良 教授 Professor Cheng-Liang Huang

**Research Area:** Raman and optical spectroscopy, Nanomaterials

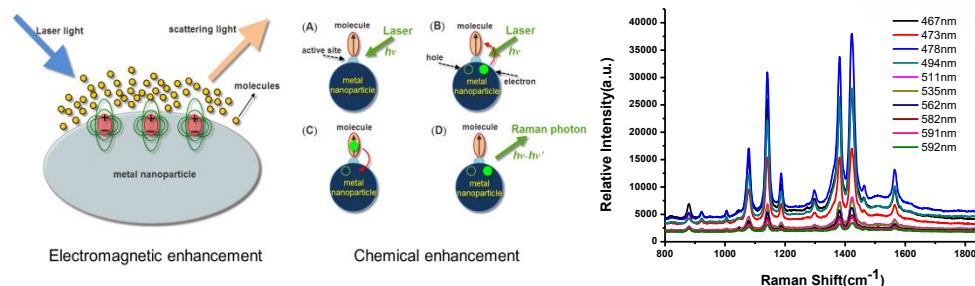
Tel: 886-271-7963, E-mail: clhuang@mail.ncyu.edu.tw

## Research Interests :

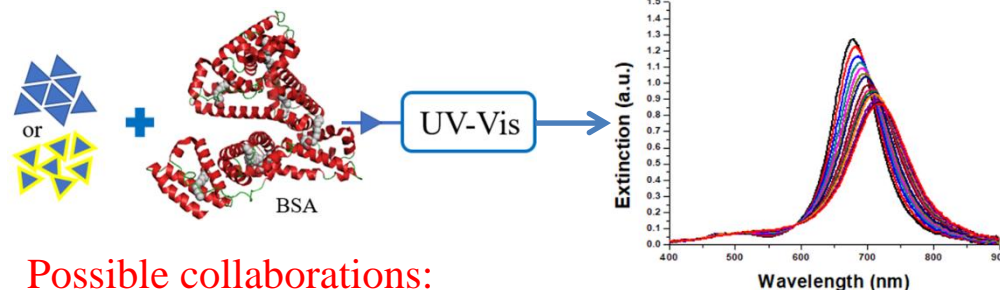
1. Synthesis of silver nanoparticles with specific shapes or LSPR bands using the photochemical reaction.



2. Applications of silver nanoparticles:  
a. Surface-Enhanced Raman spectroscopy



b. Chemical sensors or biosensors based on the time-resolved LSPR spectra of silver nanoparticles.



## Possible collaborations:

1. More plasmonic and sensing applications based on silver or gold nanomaterials.
2. Mechanism study of the growth, shape transformation and aggregation of silver nanoparticles.



王梓帆 助理教授 Assistant Professor **Tzu-Fan Wang, Ph.D**

**Research Area:** Biochemistry, Biochemical Analysis

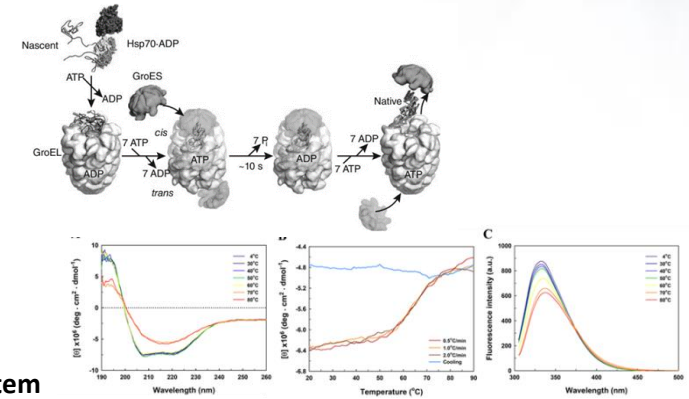
Tel: 886-271-7969, E-mail: tfwang@mail.ncyu.edu.tw

## Research Interests:

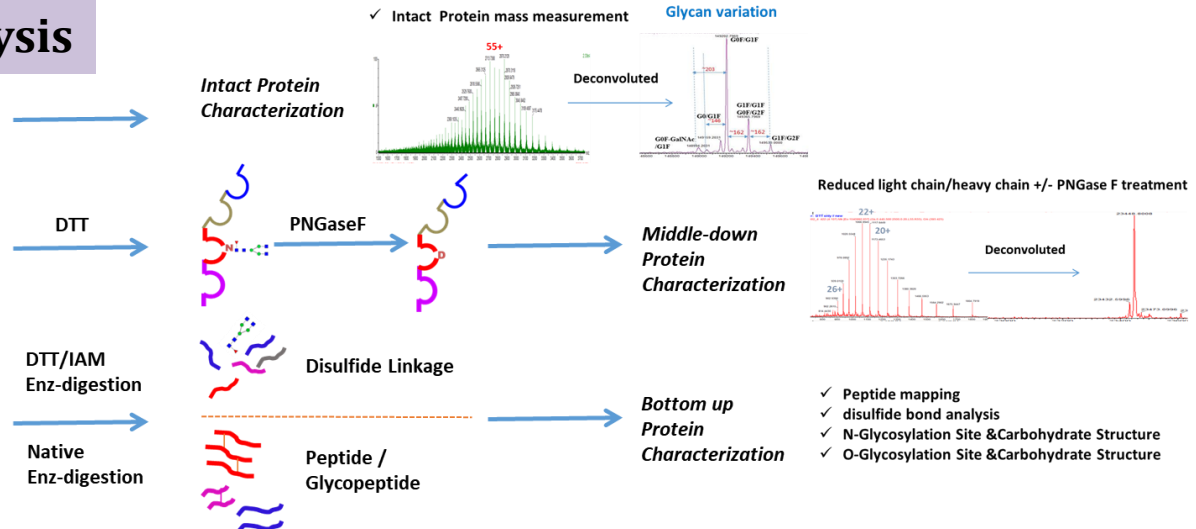
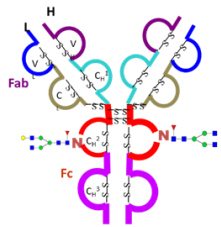
### Phosphotriesterases

- *Escherichia coli* prolidase (*EcPepQ*)
- *Pseudomonas diminuta* phosphotriesterase (*PdPTE*)

1. Expression system optimization
  - High-Yield Expression System
  - Chaperone Co-expression
  - Protein Refolding System
2. Structure and Function Characterization
  - Enzym activity assay
  - Secondary and Tertiary Structure
3. Application
  - Enzyme Immobilization
  - Chemical and Organic Co-solvent System



### Protein Drug analysis



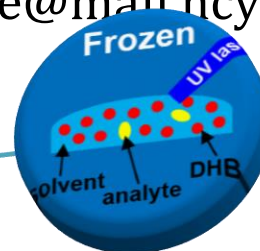
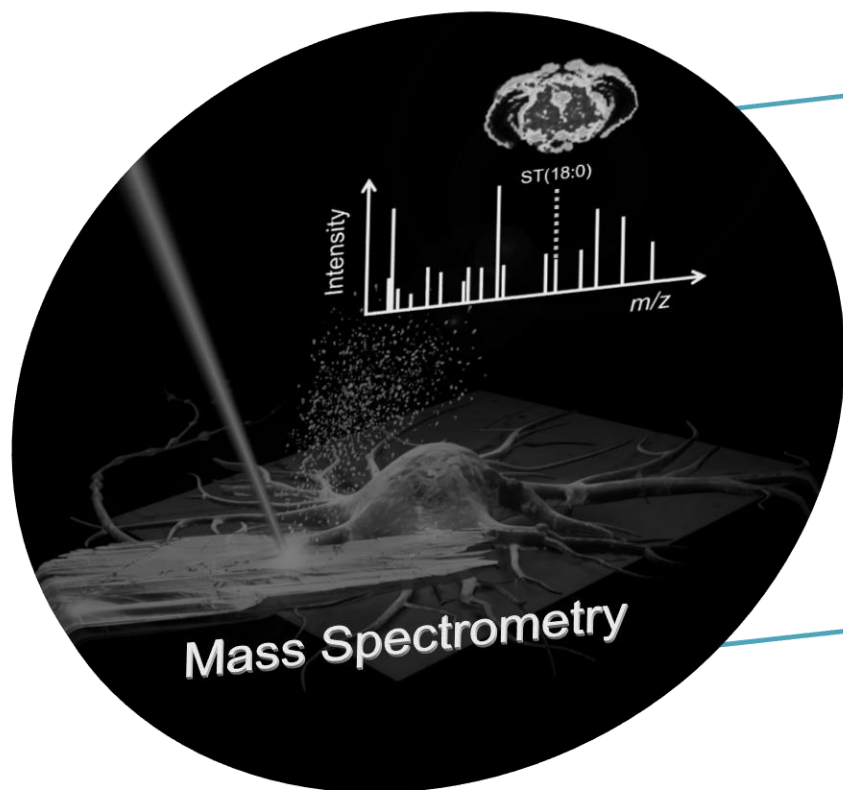


李竹平專案 助理教授 Assistant Professor

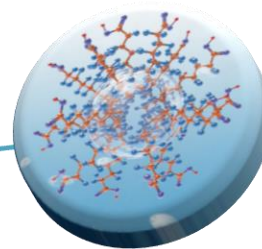
Chuping Lee, Ph.D

Research Area: Mass Spectrometry

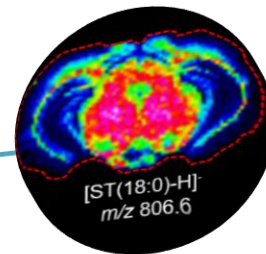
Tel: 886-271-7947, E-mail: cplee@mail.ncyu.edu.tw



Ionization mechanism  
Ionization technique



Analyte enrichment  
Nanoparticles



MALDI  
MS imaging  
Lipidomic

# Selected Publications

## Applied Chemistry

- Radical and Atom Transfer Halogenation (RATH): A Facile Route for Chemical and Polymer Functionalization. Han, Y. J.; Lin, C. Y.; Liang, M.; Liu, Y. L. *Macromol. Rapid. Commun.* **2016**, *37*, 845-850.

## Analytical Chemistry

- C. W. Hsu, C. C. Huang, J. H. Sheu, C. W. Lin, L. F. Lin, J. S. Jan, L. A. Chau, W. Chen\*(2016) Novel Method for Differentiating Histological Types of Gastric Adenocarcinoma by Using Confocal Raman *Microspectroscopy*. *PLoS One* 0,1-12

## Biochemistry

- Lin MG, Chi MC, Naveen V, Li YC, Lin LL\*, Hsiao CD\* (2016) Bacillus licheniformis trehalose-6-phosphate hydrolase structures suggest keys to substrate specificity. *Acta Crystallographica D*72:59-70.
- Deyue Yan, Lin-Kai Ni, Ho-Lun Chen, Li-Chou Chen, Yau-Hung Chen, Chien-Chung Cheng "Amphiphilic Nanoparticles of Resveratrol-Norcantharidin to Enhance the Toxicity in Zebrafish Embryo", *Bioorganic and Medicinal Chemistry Letters*, **2016**, 770-774.

# Selected Publications

## Inorganic Chemistry

- Microwave-Assisted Synthesis of Thermo- and pH-responsive Antitumor Drug Carrier Through Reversible Addition—Fragmentation Chain Transfer Polymerization. Wang, Y. M.; Zheng, S. X.; Chang, H. I.; H.Y. Tsai, H. Y.; Liang, M.\* *Express Polym. Lett.* **2017**, 11, 293-307.
- "Photo-catalytic selectivity of anthranilic acid over iron oxide incorporated titania nanoparticles Influence of the Fe<sub>2</sub> Fe<sub>3</sub> ratio of iron oxide" Ya-Hui Chang, Chun-Chang Ou, Hui-Wen Yeh, and Chung-Sung Yang\*, *Journal of Molecular Catalysis A-Chemical.* **2016**, 412, 66–77.
- Tsai-Te Lu\*,†, Yun-Ming Wang\*,‡, Chen-Hsiung Hung\*,§, Show-Jen Chiou\*, Wen-Feng Liaw\*, Bioinorganic Chemistry of the Natural Fe(NO)<sub>2</sub> Motif: Evolution of a Functional Model for NO-Related Biomedical Application and Revolutionary Development of a Translational Model. *Inorg Chem*, **2018**, 57, 12425-12443.

## Organic Chemistry

- C-H Functionalization of Amino Alcohols by Osmium Tetroxide/NMO or TPAP/NMO: Protection Group-Free Synthesis of Indolizidines (-)-223AB and 3-epi(-)-223AB. Wei-Lun Chen, Lee-Ya Wang, Yu-Jang Li\*. *Eur. J. Org. Chem.* **2020**, 103-107.
- " Facile One-pot Synthesis of Methyl 1-Aryl-1H-1,2,4-triazole-3-carboxylates from Nitrilimines with Vilsmeier Reagent" S.-E. Tsai, K.-H. Chiang, C.-C. Tseng, N.-W. Chen, C.-Y. Chern,\* and F.-F. Wong\*, *Eur. J. Org. Chem.* **2019**, 1754-1762.

- Rational Design of Cyclopenta[2,1-b;3,4-b']dithiophene-bridged Hole Transporting Materials for Highly Efficient and Stable Perovskite Solar Cells. Yan-Duo Lin,\* Kun-Mu Lee,\* Bo-Yu Ke, Kai-Shiang Chen, Hao-Chien Cheng, Wei-Juih Lin, Sheng Hsiung Chang, Chun-Guey Wu,\* Ming-Chung Kuo, Hsin-Cheng Chung, Chien-Chun Chou, Heng-Yu Chen, Kang-Ling Liao, Shih-Sheng Sun,\* Tahsin J. Chow.\* *Energy Technol.* **2019**, 7, 307 – 316.

## Physical Chemistry

- A Theoretical Study on the Stability of PtL<sub>2</sub> Complexes of Endohedral Fullerenes: The Influence of Encapsulated Ions, Cage Sizes, and Ligands. Ming-Chung Yang and Ming-Der Su\*. *ACS Omega* **2019**, 4, 3105-3113.
- A Versatile NHC-Parent Silyliumylidene Cation for Catalytic Chemo and Regioselective Hydroboration, Bi-Xiang Leong, Jiawen Lee, Yan Li, Ming-Chung Yang, Chi-Kit Siu\*, Ming-Der Su\*, and Cheuk-Wai So\*, *J. Am. Chem. Soc.* **2019**, 141, 17629-17636.
- Efficient organic solar cells based on PTB7/PC71BM blend film with embedded different shapes silver nanoparticles into PEDOT: PSS as hole transporting layers, Chih-Ping Chen, I-Chan Lee, Yao-Yu Tsai, Cheng-Liang Huang, Yung-Chung Chen, Guan-Wei Huang, *Organic Electronics*, **2018**, 62, 95-101.





College of Science & Engineering



Chemistry Building I



Chemistry Building II

***WELCOME to NCYU!!***