

國立屏東教育大學
化學生物系

教師	<p>李佳穎</p> 
職級	助理教授
服務起始年度	97/02
主要研究方向	中草藥天然物萃取分離、活性成分分析、藥理活性篩選、分析方法開發、品質管制、精油萃取技術、製程改善研究
學歷	成功大學化學博士
經歷	<ol style="list-style-type: none"> 1. 國立成功大學化學系博士後研究(2002. 01~2008. 01) 2. 高雄醫學大學香粧品學系兼任講師(2007. 02~2007. 07) 3. 大仁科技大學製藥科技研究所兼任講師(2007.08~2008.01) 4. 國立屏東教育大學應用化學暨生命科學系助理教授(2008~) 5. 國立屏東教育大學研究發展處綜合企劃組組長(2010.08~)
近五年執行及參與計畫(請註明計畫經費來源及擔任工作)	<ol style="list-style-type: none"> 1. 生理活性天然物之研究(1/3) (國科會 NSC94-2113-M-006-008, 博士後研究, 94/08/01~95/07/31) 2. 生理活性天然物之研究(2/3) (國科會 NSC 95-2113-M-006-003, 博士後研究, 95/08/01~96/07/31) 3. 仿生物層析系統於藥物及生物化合物之應用(國科會 NSC 95-2113-M-505-002, 共同主持人, 95/08/01~96/07/31) 4. 生理活性天然物之研究(3/3) (國科會 NSC 96-2113-M-006-004, 博士後研究, 96/08/01~97/01/31) 5. 生理活性天然物之探討 (國科會 NSC 98-2320-B-153-001-MY3, 主持人, 98/08/01~101/07/31) 6. 玉蘭花高值化功能性附產品開發 (經濟部 PS099170232, 主持人, 99/07/01~99/12/31)

研究成
果

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3. Wu, T. S.*; **Li, Chia-Ying**; Leu, Y. L.; Hu, C. Q.; “Limonoids and alkaloids of the root bark of *Dictamnus angustifolius*”; *Phytochemistry*; **50**; **1999**; 509-512. **SCI**
4. Wu, T. S.*; Chan, Y. Y.; Leu, Y. L.; Wu, P. L.; **Li, Chia-Ying**; *et. al.*, “Four aristolochic acid esters of rearranged *ent*-elemene sesquiterpenes from *Aristolochia heterophylla*”; *J. Nat. Prod.*; **62**; **1999**; 348-351. **SCI**
5. Wu, T. S.*; Kao, M. S.; Wu, P. L.; Lin, F. W.; Shi, L. S.; **Li, Chia-Ying**; “The bakkenolides from the root of *Petasites formosanus* and their cytotoxicity”; *Chem. Pharm. Bull.*; **47**; **1999**; 375-382. **SCI**
6. Wu, T. S.*; Tsang, Z. J.; Wu, P. L.; Lin, F. W.; **Li, Chia-Ying**; *et. al.*, “New constituents and antiplatelet aggregation and anti-HIV principles of *Artemisia capillaries*”; *Biorg. Med. Chem.*; **9**; **2001**; 77-83. **SCI**
7. **Li, Chia-Ying**; Wu, T. S.*; “Constituents of the pollen of *Crocus sativus* L. and their tyrosinase inhibitory activity”; *Chem. Pharm. Bull.*; **50**; **2002**; 1305-1309. **SCI**
8. **Li, Chia-Ying**; Wu, T. S.*; “Constituents of the stigmas of *Crocus sativus* and their tyrosinase inhibitory activity”; *J. Nat. Prod.*; **65**; **2002**; 1452-1456. **SCI**
9. Kuo, P. C.; Chiu, C. C.; Shi, L. S.; **Li, Chia-Ying**; Wu, S. J.; *et. al.*, “Non-alkaloidal constituents from the stem of *Ficus septica*”; *J. Chin. Chem. Soc.*; **49**; **2002**; 113-116. **SCI**
10. Wu, T. S.*; Hsu, M. Y.; Damu, A. G.; Kuo, P. C.; Su, C. R.; **Li, Chia-Ying**; *et. al.*, “Constituents of Leaves of *Phellodendron chinense* var. *glabriusculum*” *Heterocycles*, **60**, **2003**, 397-404. **SCI**

11. Wu, T. S.*; Hsu, M. Y.; Kuo, P. C.; Sreenivasulu, B.; Damu, A. G.; Su, C. R.; **Li, Chia-Ying**; *et. al.*, “Constituents of leaves of *Phellodendron amurense* var. *wilsonii*.” *J. Nat. Prod.*, **66**, **2003**, 1207-1211. **SCI**
12. Lin, C. H.; **Li, Chia-Ying**; Kuoh, C. S.; Wu, T. S.*; “Constituents of the leaves of *Petasites formosanus* and their antioxidative activity.”, *Heterocycles*, **60**, **2003**, 1881-1889. **SCI**
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14. **Li, Chia-Ying**; Lee, E. J.; Wu, T. S.; “Antityrosinase principles and constituents of the petals of *Crocus sativus*.” *J. Nat. Prod.*, **2004**, **67**, 437-440. **SCI**
15. Jou, J. H.; **Li, Chia-Ying**; Wu, T. S.; “The analysis of the analogues of aristolochic acid and aristololactam in the plant of *Aristolochia* genus by HPLC.” *J. Food. Drug Anal.*, **12**, **2004**, 40-45. **SCI**
16. **Li, Chia-Ying**; Lin, C. H.; Wu, C. C.; Wu, T. S.; “Efficient ¹H NMR Method for Improved Quality Control Analyses of Ginkgo Constituents.” *J. Agric. Food Chem.*, **2004**, **52**, 3721-3725. **SCI**
17. Lin, C. H.; **Li, Chia-Ying**; and Wu, T. S.; “A Novel Phenylpropenoyl Sulfonic Acid and a New Chlorophyll from the Leaves of *Petasites formosanus* Kitamura” *Chem. Pharm. Bull.*, **2004**, **52**, 1151-1152. **SCI**
18. Damu, A. G.; Kuo, P. C.; **Li, Chia-Ying**; Shi, L. S.; Kuoh, C. S.; *et. al.*, “Phenanthroindolizidine alkaloids from the stem of *Ficus septica*.” *J. Nat. Prod.*, **2005**, **68**, 1071-1075. **SCI**
19. **Li, Chia-Ying**; Lin, C. H.; Wu, T. S.; “Quantitative Analysis of Camptothecin Derivatives in *Nothapodytes foetida* Using ¹H NMR Method.” *Chem. Pharm. Bull.*, **2005**, **53**, 347-349. **SCI**
20. Chih-Yang Chiu, **Chia-Ying Li**, Chao-Chen Chiu, Shih-Pin Hsu, *et. al.*, “Constituents of Leaves of *Phellodendron japonicum* Maxim. and Their Antioxidant Activity.” *Chem. Pharm. Bull.*, **2005**, **53**, 1118-1121. **SCI**

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23. **Li, Chia-Ying**; Lu, H. J.; Lin, C. H.; Wu, T. S.; “A Rapid and Simple Determination of Protoberberine Alkaloids in Cortex *Phellodendri* by ¹H NMR and Its Application for Quality Control of Commercial Traditional Chinese Medicine Prescriptions.” *J. Pharm. Biomed. Anal.*, **2006**, 40, 173-178. **SCI**
24. **Li, Chia-Ying**; Chiu, C. H.; Huang H. S.; Lin, C. H.; Wu, T. S.; “High performance liquid chromatographic method for simultaneous quantification of eight major biologically active ingredients of in “Da-Chai-Hu-Tang” Preparation.” *Biomed. Chromatogr.*, **2006**, 20, 305-308. **SCI**
25. C. H. Leu; **Chia-Ying Li**; Yao, X.; and Tian-Shung Wu “Constituents from the Leaves of *Phellodendron amurense* and Their Antioxidant Activity.” *Chem. Pharm. Bull.*, **2006**, 54, 1308-1311. **SCI**
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28. **Chia-Ying Li**, Tian-Shung Wu: “A Brief Review on Chemical Constituents and Their Bioactivity from *Crocus sativus* L.” *Chin. J. Nat. Med.*, **2006**, 11, 55-59
29. **Chia-Ying Li**, Wei-Jern Tsai, A. G. Damu, Nguyen Xuan Dung, Tran Dinh Thang, *et. al.*, “Isolation and Identification of Antiplatelet Aggregatory Principles from the Leaves of *Piper lolot*” *J. Agric. Food Chem.*, **2007**, 55, 9436-9442. **SCI**

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31. Chuan-Chung Tsao, Yuh-Chiang Shen, Chung-Ren Su, **Chia-Ying Li**, *et. al.*, “New Diterpenoids and the bioactivity of *Erythrophleum fordii*” *Bioorg. Med. Chem.*, **2008**, 16, 9867-9870. **SCI**
32. **Chia-Ying Li**, Hong-Xi Xu, Quan-Bin Han, Tian-Shung Wu: “Quality assessment of Radix Codonopsis by quantitative nuclear magnetic resonance” *J. Chromatogr. A*, **2009**, 1216, 2124-2129. **SCI**
33. **Chia-Ying Li**, Sung-I Tsai, Amooru G. Damu, Chung-Ren Su, Tian-Shung Wu: “A Rapid and Simple Determination of Protoberberine Alkaloids in Rhizoma Coptidis by ¹H NMR and Its Application for Quality Control of Commercial Prescriptions” *J. Pharm. Biomed. Anal.*, **2009**, 49, 1272-1276. **SCI**
34. A. G. Damu, P. C. Kuo, L. S. Shi, **Chia-Ying Li**, and Tian-Shung Wu: “Cytotoxic Phenanthroindolizidine Alkaloids from the Roots of *Ficus septica*” *Planta Med.*, **2009**, 75, 1152-1156. **SCI**
35. H. H. Chan; **Chia-Ying Li**; Tian-Shung Wu: “A Novel Anthraquinone Sulfonic Acid from *Ophiorhiza hayatana* Ohwi.” *Arch. Pharm. Res.*, **2010**, in press. **SCI**
36. **Chia-Ying Li**, Shih-Min Lin, Chung-Ren Su, Chao-Chen Chiu, Hsiu-Hui Chan, Tian-Shung Wu: “A rapid and simple determination of ephedrine alkaloids in *Ephedra* species and their preparations by ¹H NMR method” *J. Nat. Prod.*, **2010**, in submitted. **SCI**

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1. The constituents of the root bark of *Dictamnus angustifolius*, Wu, T. S.; **Li, Chia-Ying**; Leu, Y. L.; **First Symposium on Marine Natural Products**, Mar. 14, 1998, Kaohsiung, Taiwan.
2. The constituents form the Pollen of *Crocus sativus*, **Li, Chia-Ying**; Wu, T. S.; **2000 Years of**

Natural Products Research-Past, Present and Future , Jul.26~30, 1999, Amsterdam, the Netherlands.

3. Evaluation of the homonymous herbal drug in Taiwan Market, Wu, T. S.; **Li, Chia-Ying**; Chang, Y. S.; **中草藥科技化研討會**, Dec. 9, 2000, Tainan, Taiwan.
4. 番紅花花瓣之成分及活性研究, **Li, Chia-Ying**; Wu, T. S.; **2001 Annual Meeting of Chemical Society Located in Taipei**, Dec. 27~Dec. 29, 2001, Tainan, Taiwan.
5. Non-alkaloidal constituents from the stem of *Ficus septica*, Kuo, P. C.; Chiu, C. C.; Shi, L. S.; **Li, Chia-Ying**; *et. al.*, **2002 PSCT Medicinal Chemistry Symposium**, February 4-6, 2002, The Pharmaceutical Society of Republic of China, Tainan, Taiwan.
6. Constituents of leaves of *Phellodendron amurense var. wilsonii*, Wu, T. S. *; Hsu, M. Y.; Kuo, P. C.; Sreenivasulu, B.; Damu, A. G.; Su, C. R.; **Li, Chia-Ying**; Chang, H. C.; **The Seventieth Anniversary of Chinese Chemical Society located in Taipei**, October 25-27, 2002, The Chinese Chemical Society located in Taipei, Taipei, Taiwan.
7. Constituents of the stigma of *Crocus sativus* L. and their tyrosinase inhibitory activity, **Li, Chia-Ying**; Wu, T. S.; **50th Annual Congress of the Society for Medicinal Plant Research**, Sep. 8-12, 2002, Society for Medicinal Plant Research, Barcelona, Spain.
8. Constituents of leaves of *Phellodendron chinense var. glabriusculum*, Wu, T. S. *; Hsu, M. Y.; Damu, A. G.; Kuo, P. C.; Su, C. R.; **Li, Chia-Ying**; Sun, H. D.; **Annual Meeting of The Pharmaceutical Society of Republic of China**, December 21-22, 2002, The Pharmaceutical Society of Republic of China, Pingtung, Taiwan.
9. Antityrosinase principles and constituents of the petals of *Crocus sativus*, **Li, Chia-Ying**; Wu, T. S.*; **11th Asian Symposium on Medicinal Plants, Spices and Other Natural Products (ASOMPS XI)**, October 26-30, 2003, Kunming, China.
10. Studies on the Constituents and Bioactivity of *Crocus sativus* and the Catabolic Process of Bisbenzyltetrahydroisoquinoline Alkaloids of *Aristolochia elegans* Mast, Wu, T. S. *; Tsai, Y.

- L.; Shi, L. S.; **Li, Chia-Ying**; and Kuo, P. C.; **2nd International Symposium on Modern Industrial Technology in Chinese Herbs-New Drug Development of TCM and 18th Symposium on National Products**, October 31-November 2 2003, Kaohsiung, Taiwan.
11. Constituents of the leaves of *Petasites formosanus* and their antioxidative activity, Lin, C. H.; **Li, Chia-Ying**; Wu, T. S.; **2nd International Symposium on Modern Industrial Technology in Chinese Herbs-New Drug Development of TCM and 18th Symposium on National Products**, Oct. 31~Dec. 2, 2003, Kaohsiung, Taiwan.
 12. 細說馬兜鈴酸, 吳天賞, **李佳穎**, **2004 中草藥產業現代化研討會**, Jun. 4, 2004, Kaohsiung, Taiwan.
 13. Quantitative Analysis of Camptothecin Derivatives in *Nothapodytes foetida* Using ¹H NMR Method, **Li, Chia-Ying**; Lin, C. H.; Wu, T. S.; **2004 Annual Meeting of Chemical Society Located in Taipei**, Nov. 19~Nov. 21, 2004, Taichung, Taiwan.
 14. Qualitative and Quantitative Analysis of Ephedrine Analogues from *Ephedra* Species Using ¹H-NMR, **Li, Chia-Ying**; Lin, S. M.; Lin, C. H.; Wu, T. S.; 93 Annual Meeting of The Pharmaceutical Society of Republic of China, Dec. 18, 2004, Taipei, Taiwan.
 15. Quantitative Analysis of Ephedrine Analogues from *Ephedra* spp. Preparations Using ¹H-NMR, **Li, Chia-Ying**; Lin, S. M.; Lin, C. H.; Wu, T. S.; 93 Annual Meeting of The Pharmaceutical Society of Republic of China, Dec. 18, 2004, Taipei, Taiwan.
 16. Constituents of the Leaves of *Phellodendron japonica* and their Bioactivity, Wu, T. S.; Chiu C. Y.; Kitanaka S.; Niwa M.; **Li, Chia-Ying**; Kuo, P. C.; **The 125th Annual Meeting of the Pharmaceutical Society of Japan**, Mar. 28, 2005, Tokyo, Japan.
 17. Constituents of the Leaves of *Phellodendron japonica* and their Bioactivity, Ping-Chung Kuo, **Chia-Ying Li**, Tian-Shung Wu; **2005 Annual Meeting of Kaohsiung chapter of Chemical Society Located in Taipei**, May 28, 2005, Tainan, Taiwan.
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Using $^1\text{H-NMR}$ Method, **Chia-Ying Li**, Shih-Min Lin, Chung-Hua Lin; **The 20th Annual Meeting of Natural Products**, June 24, 2005, Taipai, Taiwan.

19. Constituents of the Leaves of *Phellodendron japonica* and their Bioactivity, Ping-Chung Kuo, **Chia-Ying Li**, Tian-Shung Wu; **The 20th Annual Meeting of Natural Products**, June 24, 2005, Taipai, Taiwan.
20. Cytotoxic Phenanthroindolizidine Alkaloids from the Stems of *Ficus septica*, Amooru G. Damu, Ping-Chung Kuo, Li-Shian Shi, **Chia-Ying Li**, Chung-Ren Su, and Tian-Shung Wu; **2005 Annual Meeting of Chemical Society Located in Taipei**, Nov. 19-20, 2005, Kaohsiung, Taiwan.
21. High-performance liquid chromatographic method for simultaneous quantification of eight major biologically active ingredients in “Da-Chai-Hu-Tang” Preparation, **Chia-Ying Li**, Ho-Shin Huang, and Tian-Shung Wu; **94 Annual Meeting of The Pharmaceutical Society of Republic of China**, Dec. 17-18, 2005, Tainan, Taiwan.
22. Concise Synthesis of Denbinobin and a Formal Synthesis of Moniliformin, **Chia-Ying Li**, and Tian-Shung Wu; **8th International Symposium on Organic Reaction (ISOR-2006)**, April 23-26, 2006, Kobe, Japan.
23. Determination of Aristolochic Acids in *Aristolochia* species by $^1\text{H NMR}$ Method, Tian-Shung Wu and **Chia-Ying Li**; **Fifth Meeting of Consortium for Globalization of Chinese Medicine**, September 20-23, 2006, Zhuhai, China
24. Efficient Method for Quality Control Analyses of Traditional Chinese Medicines, **Chia-Ying Li**; **3rd NHRI Conference on Traditional Medicine Research-from Bench to Clinic**, Set. 29-30, 2006, Taipei, Taiwan.
25. Determination of Aristolochic Acids in *Aristolochia* species by $^1\text{H NMR}$ Method, Tian-Shung Wu and **Chia-Ying Li**; **The 21th Annual Meeting of Natural Products**, November 18-19, 2006, Taichung, Taiwan.

	<p>26. New Constituents and Antiplatelet Aggregation Principles of <i>Piper lolot</i>, <u>Chia-Ying Li</u> and Tian-Shung Wu; 第一屆海峽兩岸三地中藥與天然藥物化學高峰論壇, Oct.6-7, 2007, 上海</p> <p>27. Effect of arsenite and arsenate on microglial cell survival, Tsung-Jung Wu, Shih-Ting Weng, <u>Chia-Ying Li</u> and Shun-Fen Tzeng; The 3rd International Congress on Arsenic in the Environment, May 17-21, 2010, Tainan, Taiwan.</p> <p>28. Study of applying nano titanium dioxide and zinc oxide to whitening cream with sunscreen, Kun-You Se, yu-fun Lin, kun-sun Zhao, Zu-Hui Zhang, Zi-Yue Huang and <u>Chia-Ying Li</u>; 2010 Annual Meeting of Kaohsiung chapter of Chemical Society Located in Taipei , May 29, 2010, Tainan, Taiwan.</p> <p>專書及專書論文</p> <ol style="list-style-type: none"> 1. 李佳穎著：國立成功大學化學研究所博士論文-番紅花與狹葉白鮮皮之成分、活性研究及 Phenanthraquinones 之合成 2. 田憲儒、吳天賞、李佳穎編著：雜環化學入門 3. 吳天賞、李佳穎、郭賓崇、蘇崇仁等共著：馬兜鈴之研究
<p>主要教學科目</p>	<p>天然物化學、藥物設計原理與開發、應用光譜學、儀器分析、普通化學</p>
<p>教授課程與本系整體課程之關連</p>	<p>本學系以培養學生具備應用化學與生命科學領域之整合性知能為教育目標之一。而中草藥產業是高附加價值、結合應用化學與生命科學的跨領域科技產業，近年來政府亦大力推動生技製藥及中草藥科技化產業之發展。有鑑於此，教授之課程包含天然物化學、藥用植物特論與藥物設計原理與開發等基礎與進階課程，強調中草藥或其他天然材料的研究方法及對各種天然產物的深入了解，並介紹藥物作用機轉與新藥設計策略，期使學生對製藥產業及中草藥科技有清楚的認識。儀器分析、應用光譜學則是研究過程中不可或缺的一項重要課目，藉由此課程的講授，期能訓練學生在各項光譜分析儀器的運用能有更深一層的體認，以及能掌握藥物開發過程中可能運用到的實驗技能。</p>
<p>研究發展方向</p>	<p>中藥歷經數千年的人體實驗，對新藥開發提供了一條最好的捷徑。往昔受限於各種實驗技術與儀器，故很少以現代醫學方法加以評估其藥效，也因此常被譏為不科學。近年來各種先進</p>

	<p>的儀器和新分析材料的出現與新藥理篩選方法的建立，以及全世界崇尚自然療法的蓬勃發展，此為中藥發展之最佳契機。天然物中草藥的活性成分分離是本研究室的研究重點。針對一些具有生理活性的天然植物或微生物來源進行活性成分分離與結構鑑定研究，除了可以發現新化合物之外，所分離得到的成分將可作為進行活性測試的成分來源，而具有不錯的生理活性之成分，可嘗試其全合成或半合成。甚至可以進一步對具有生理活性之成分進行衍生化反應，以嘗試合成得到活性更高之化合物，以使藥物資源的開發與利用可以獲得最高的效益。而研究題材評估其安全性，若具有顯著活性而無毒性，亦可開發成為保健食品。另外，隨著國際間對中草藥的重視，中藥科學化已是一個相當重要的課題，如何能有效定性定量來源藥材之活性成分、真偽藥之鑑別，對中藥科學化具有決定性的影響。因此中草藥品質管制及分析方法開發也將是本實驗室的另一重點項目。</p> <p>總括來說，本實驗室的研究重點如下：</p> <ol style="list-style-type: none"> 1. 具生理活性天然物活性成分分離研究 2. 抗氧化、美白、調節血糖、抗過敏、抗癌、神經保護..等活性成分篩選 3. 先導藥物合成 4. 中草藥品質管制方法開發 5. 中草藥化妝保養品研發 6. 芳香精油萃取技術 7. 能源作物附加價值開發
<p>專利或研究成果應用情形</p>	<p>專利 吳天賞, <u>李佳穎</u>, 王玉杯, 一種快速定性與定量分析銀杏製品中所含之活性成分的方法, 2006, 中華民國專利 I266874, Nov.11, 2006~Sep.30, 2024.</p>
<p>校內專業服務</p>	<ol style="list-style-type: none"> 1. 化生系專題演講：中草藥活性成分研究發展。2008.05.19 2. 屏東教育大學 97 學年度學士班轉學考試委員。2008.06.11 3. 97 學年度化生系研究所二年級班級導師。 4. 97 學年度化生系學生輔導委員會委員。 5. 化生系 98 級畢業成果發表會籌備委員。 6. 化生系 98 級畢業成果發表會召集人。 7. 屏東教育大學 97 學年度畢業典禮籌備委員。 8. 98 學年度化生系大學部四年級班級導師。 9. 98 學年度化生系學生輔導委員會委員。 10. 化生系 99 級畢業成果發表會籌備委員。 11. 屏東教育大學 98 學年度畢業典禮籌備委員。 12. 屏東教育大學 99 學年度碩士班入學考試委員。 13. 屏東教育大學 99 學年度教學卓越計劃撰寫小組。 14. 99 學年度化生系大學部一年級班級導師。 15. 屏東教育大學 99 學年度理學院院務委員。

	<p>16. 屏東教育大學研究發展處綜合企劃組組長(99.08~)。</p> <p>17. 屏東教育大學 99 學年度出版品工作小組委員兼執行秘書。</p> <p>18. 屏東教育大學 99 學年度自我評鑑委員會委員兼執行秘書。</p> <p>19. 屏東教育大學 99 學年度學校行銷推廣委員會執行秘書。</p> <p>20. 屏東教育大學 99 學年度技術審查委員會委員。</p> <p>21. 屏東教育大學 99 學年度性別平等教育工作小組委員。</p>
校外專業服務	<p>1. 中華民國農科園區產學協會農科園區進駐企業(朝海生物科技股份有限公司)輔導訪視委員。2008.07.21</p> <p>2. 莊松榮製藥有限公司專題演講：質譜在分子結構分析之應用。2008.07.24</p> <p>3. 國立成功大學化學研究所碩士論文口試委員。2008.07.25</p> <p>4. 中華民國農科園區產學協會農科園區進駐企業(楓荷實業股份有限公司)輔導訪視委員。2008.08.25</p> <p>5. 屏東縣第 49 屆全縣國民中小學科學展覽會化學科評審委員。2009.04.22、2009.05.06</p> <p>6. 國立成功大學生命科學研究所碩士論文口試委員。2009.07.26</p> <p>7. 教育部優質化強化科學菁英培育計畫系列活動-國立潮州高中強化科學菁英演講活動：傳統與現代-由科學觀點看中草药。2010.04.11</p> <p>8. 經濟部「學界協助中小企業科技關懷計畫」輔導諮詢專家。2010.05~</p> <p>9. 國立成功大學生命科學研究所碩士論文口試委員。2010.06.11</p> <p>10. 楓荷生物科技股份有限公司(經濟部關懷計畫)輔導諮詢專家。2010.07.01~2010.12.31</p> <p>11. 農科園區企業產學合作諮詢專家。2010.07~</p>

附表一 負責保管之儀器設備

1. 直立式旋轉真空濃縮機
2. 真空控制器
3. 乾式真空幫浦
4. 水流抽氣幫浦
5. 冷卻循環機
6. 冰箱
7. 多功能光譜分析儀
8. 手持式紫外光燈
9. 電磁加熱攪拌器
10. 高效能液相層析儀
11. 光電二極陣列偵檢器

