行政院國家科學委員會專題研究計畫　成果報告

淡江大學貴重儀器共同使用服務計畫

計畫類別：個別型計畫
計畫編號：NSC91-2731-P-032-001-
執行期間：91 年 01 月 01 日至 91 年 12 月 31 日
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計畫主持人：魏和祥

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淡江大學貴重儀器共同使用計劃服務成果報告

計畫編號：NSC-90-2518-S-032-001
(執行期間 91 年 1 月~91 年 12 月)
：**魏和祥**　淡江大學 化學系

(一).SIEMENS P4 四環 X-ray 繞射分析儀

負責教授: 魏和祥 教授　操作員: 林信宏

儀器性能及附屬設備:

P4 四環單晶繞射儀,置於空調控濕之化學館一樓精密儀器室內,其 X-ray 源為鉬靶波長為 0.7103Å,主要可以用來解析 1mm(三邊長)以下的有機化合物及無機錯合物的單晶樣品.

服務成果:

(1)每件樣品以繞射點數為收費標準
(2)服務對象包括淡江大學,中台技術學院,經國健康暨管理學院,樹德醫事專校,及產業界等.
(3)服務時數統計表如下:
本儀器開放使用時數:120 小時/週;維修時數:8 小時/週

91.1.1 至 91.12.31 服務成果統計表			
項　目	時　數	件　數	收 入 金 額
校　內	3080	88	468000
校　外	770	22	123000
合　計	3850	110	591000

(4)論文發表:

1. Sasankasekhar Mohanta, Hsin-Huang Lin, Chin-Jhan Lee, Ho-Hsiang Wei, “A two-dimensional $Cu^{II}Gd^{III}$ compound self-assembled by H-bonding and intermolecular weak coordinate bonding between the dinuclear cores: structure and magnetic properties”, Inorganic Chemistry Communications, Vol. 5, page 585-588, (2002).
2. Hsin-Huang Lin, Sasankasekhar Mohanta, Chin-Jhan Lee, Ho-Hsiang Wei,”Syntheses, Crysatl Engineering, and Magnetic property of a Dicyanamide Bridged Three-Dimensional Manganese(Ⅱ)-Nitronyl Nitroxide Coordination Polymer Derived from a New Radical”, Inorganic Chemistry, Vol 42, page 1584-1589, (2003).
3. Sheng-Chuan Cheng, Ho-Hsiang Wei, “Structure, magnetic properties and

catecholase activity study of oxo-bridged dinuclear cooper(Ⅱ) complexes", Inorganica Chimica Acta, Vol 340, page 105-113, (2002).
4. Sheng-Chuan Cheng, Cheng-Wei Chang, Ho-Hsiang Wei, Gene-Hsiang Lee, Yu Wang,"Mononuclear Iron(Ⅲ) and Manganese(Ⅲ) Complex with Substituted Salicylaldimine Ligand:Structure, Magnetic Properties, and Catalytic Activity of Olefins-Epoxidation", Journal of the Chinese Chemical Society, Vol 50, page 41-46, (2003).

（二）Schottky FESEM : Leo 1530　91 年度貴重儀器共同使用服務成果報告：

負責教授：林達鎔，鄭廖平。　　技術員：蔡信武。

儀器性能及周邊條件與附屬設備

本項貴重儀器運作計劃之場放射掃描電子顯微鏡LEO 1530 裝置於空調控濕之工學院精密儀器中心電子顯微鏡室內，磁場強度小於 0.5 m Gauss，正常情形下震動小於 2ì m，符合原廠要求的標準，因此真正實用解析性能超出原廠的規格。

LEO 1530 規格為全世界最先進且唯一配備 Gemini Column 之 Schottky FESEM。在適當的操作條件之下，可以不鍍金而進行觀測，最大的特點是能很有效率的以極低的加速電壓進行觀測分析。本儀器配備 in-lens 環狀二次電子訊號檢測器，能收集最多的二次反射電子訊號，表現最佳的成像效果與解析度。原廠保證最佳解析度在加速電壓 20 kV 時為 1 nm，1 kV 下的解析度 2 nm，最低工作加速電壓為 200 V。對於導電性差及材質脆弱之樣品，可以利用高解析鍍膜機進行樣品的前處理。鍍膜層依靶材的不同，其的顆粒大小從 0.5 nm 到 1.2 nm。

92 年度已經添購 EDS，預計 6 月份可以加入服務項目。

執行情形與服務成果

1. 維護：

第一次場放射燈絲更換：90 年 12 月更換 FEI 燈絲。

第二次場放射燈絲更換：91 年 11 月更換 Denka 燈絲。

91 年初（2 月份）發生地震，燈絲發生偏移，經維修調整 2 週，逐漸恢復服務。此外真空控制電路板，真空度檢測器以及不斷電系統等也都進行維修工作。

91 年 10 月份，機器出現對焦控制與解析度的嚴重問題，經 1 個月左右的檢測及與原廠的技術部門聯繫，確認高壓系統 EHT 出現不穩定的現象。有 1 個多月時間，暫時借用廠商的維修用備品，並進行更新 EHT 系統。

2. 服務：

Leo 1530 場放射掃描電子顯微鏡性能優異，承接第一年（90 年度）的經驗，儀器使用大致上良好，第二年貴重儀器運作服務成果也很具成效。為了解析奈米尺度的結構，有機與無機陶瓷材料的樣品目前已鉑鈀合金表面鍍層，從 1 nm 到 2 nm，加速電壓從 1 kV 到 3 kV，最高觀測倍率可以達到 30 萬到 50 萬。

經由兩年來貴重儀器運作計劃的培養,本儀器專門的技術操作人員蔡信武先生，目前已經完全符合操作服務與基本維護的標準，提供專業水準的服務。

場放射掃描電子顯微鏡應用的範圍極廣,國內使用的單位涵蓋全國各大專院校及各相關學術研究單位。本年度使用的對象主要為化工及材料科學，此外尚有機械、物理、化學、電子、醫工等。第二年貴重儀器運作計劃中，已經進行場放射電子槍的燈絲更換。另外，由於高壓系統在年底突然出現問題，整個經費的運用出現嚴重的困難，經由本係性學校極力的爭取，暫時解決部分經費。將於下年度提貴重儀器運作計畫的執行中，進行經費運用的檢討。

其他儀器真空系統的離子真空幫浦、渦輪真空幫浦與真空腔之真空度相關，直接會影響到解析度，因此往後將增加真空系統之轉動機件部分的維護，才能使得儀器不會停擺，影響服務品質與時間。此外，由於儀器裝置於空調控濕之良好環境，其他儀器控制面板與一些零組件目前未出現損壞的情形。

無論目前或未來，國內學術研究甚為倚重配備 Gemini Column 之 Schottky FESEM。尤其奈米科技的研究，已經成為世界上的重要研究潮流。92 年度已經添購 EDS，希望未來能再添購超微切片機。擴展目前使用的奈米形態結構分析到奈米區域尺度的化學元素分析，期能提供更新、更強的功能，使國內學術研究的工作能具備紮實的國際競爭學術能力，對於產業界也能起帶頭的作用。

總計去年服務的成果如下：

91 年度儀器開放使用時數：<u> 24 </u>小時/**週**，<u> 1200 </u>小時/**年**；維修時數 <u> 6 </u>小時/週。

90.1.1 至 90.12.31 貴儀服務成果統計表			
項　　目	時　　數	件　　數	收　入　金　額*
校　　內	657	219	1,314,000
校　　外	36	12	72,000
合　　計	693	231	1,386,000

*每件工作時數以 3 小時計算，含樣品覆膜處理，每件費用 6,000 元。

（1）服務成果：總計件數 228 件，時數 693 小時

（2）服務對象：包括台灣大學醫工所、台灣科技大學化工系、成功大學、雲林科技大學、以及工研院、產業界等。

（3）論文發表：

1. Liao-Ping Cheng, Tai-Horng Young*, WenuYuan Chuang, Li-Yen Chen, Leo-Wang Chen, 2001/1, “ The formation mechanism of membranes prepared from the non-solvent-solvent-crystalline polymer systems,” Polymer, Vol. 42, page 443-451.
2. Tai-Horng Young, Chii-Wann Lin, Liao-Ping Cheng and Chih-Chen Hsieh, 2001, “Preparation of EVAL membranes with smooth and particulate morphologies for neuronal culture, ” Biomaterials, Vol. 22, page1771-1777.
3. Hung Hsu, Dar-Jong Lin, Liao-Ping Cheng, Jen-Taut Yeh, Kan-Nan Chen, 2001, “ in-situ Compatibilization Mechanism of High-Density Polyethylene/Polamide 6 Blend, ” J. Polym. Res., Vol. 8, No. 4, page209-217.
4. Dar-Jong Lin, Cheng-Liang Chang, Tzung-Chin Chen, Liao-Ping Cheng, 2002, “On the Structure of Porous Poly(vinylidene fluoride) Membrane Prepared by Phase Inversion from Water-NMP-PVDF System,” Tamkang Journal of Science and Engineering, 2, 95-98.
5. Dar-Jong Lin, Cheng-Liang Chang, Tzung-Chin Chen, Liao-Ping Cheng*, 2002, “ Microporous PVDF membrane formation by immersion precipitation from water/TEP/PVDF system,” Desalination, 145, 25-29.
6. Dar-Jong Lin, Liao-Ping Cheng, Shih-Pin Lin, 2002, ”Effect of compatible nucleation seeds on the morphology of porous Nylon 6 membrane,” Desalination, 145, 31-37.
7. Dar-Jong Lin, Ching-Chung Chen, Yi-Che Su, Liao-Ping Cheng*, 2002, “Observation of nano-particles in silica/poly(HEMA) hybrid by electron microscopy," Journal of Polymer Research, 9, 115-118.
8. Dar-Jong Lin, Cheng-Liang Chang, Fane-Ming Huang, Liao-Ping Cheng*, 2003, “ Effect of Salt Additive on the Formation of Microporous Poly(vinylidene fluoride) Membranes by Phase Inversion From LiClO4/Water/DMF/PVDF System," Polymer, 44, 413-422, 2003.
9. Liao-Ping Cheng, Yen-Shih Huang, Tai-Horng Young*, 2003, “Effect of the temperature of polyurethane dissolution on the mechanism of wet-casting membrane formation, ” European Polymer Journal, 39/3, 601-607.
10. Dar-Jong Lin, Konstantinos Beltsios, Cheng-Liang Chang, Liao-Ping Cheng*, 2003, “The Fine Structure and Formation Mechanism of Particulate Phase Inversion Poly(vinylidene fluoride) Membranes, in print.
11. Hsuan-Fu Yu and Kao-Chao Huang, 2002, “Preparation and characterization of ester-derived $BaFe_{12}O_{19}$ powder”, *J. Mater. Res.*, 17(1), 199-203.
12. Hsuan-Fu Yu and Kao-Chao Huang, 2003, “Effects of pH and citric acid contents on characteristics of ester-derived $BaFe_{12}O_{19}$ powder”, *J. Magn. Magn. Mater.*, 260(3), 455-461.
13. Gwo-Geng Lin, Hsi-Hsin Shih and Ping-Chang Chai, 2002, “Influences of Side-Chain Structures on the Viscoelasticity and Elongation Viscosity of Polyethylene Melts,” *Polymer Engineering and Science* (CA, CCI, EI, SCI), Vol 42, No. 11, p2213-2221 (NSC 87-2216-E-032-004-)
14. 林國賡;張簡義峰, 2002, “擠出機製備耐隆奈米複材之實驗研究及其流變分析”, *強化塑膠廣用新知*, 93 期, 42～48 頁
15. Trong-Ming Don, Yun-Ru Chen, Wen-Yen Chiu, 2002, “The Synthesis of Chitin-g-Poly(vinyl acetate) Copolymers with a Redox Initiator”, J. Polym. Research, Vol. 9: 257–263. (SCI) NSC 90-2313-B-032-001-

16. Trong-Ming Don, Chung-Yang Chuang and Wen-Yen Chiu, “Studies on the Degradation Behavior of Chitosan-g-Poly(acrylic acid) Copolymers”, Tamkang Journal of Science and Engineering, Vol. 5, No. 4, Dec. 2002, pp. 235-240. NSC 90-2313-B-032-001-
17. K.-C. Cheng, Trong-Ming Don, W. Guo, T.-H. Chuang, 2002, “Kinetic Model of Hyperbranched Polymers Formed by the Polymerization of AB2 Monomer with a Substitution Effect”, Polymer, vol. 43, 23, pp. 6315-6322. (SCI)
18. K.-C. Cheng, Trong-Ming Don, S.-P. Rwei, Y.-C. Li, Y.-F. Duann, 2002, “Monte Carlo Simulation of Diepoxides with Monoepoxides Cured with Amines”, J. Polym. Sci., Part B: Polym. Phys., Vol. 40, 1857-1868. (SCI)
19. Shih-Chang Hsu, Trong-Ming Don and Wen-Yen Chiu, 2002, “Synthesis of Chitosan- Modified Poly(methyl methacrylate) by Emulsion Polymerization“, J. Appl. Polym. Sci., Vol. 86, 3047-3056. (SCI) NSC 90-2313-B-032-001-
20. Trong-Ming Don, J.-F King, and Wen-Yen Chiu, 2002, “Synthesis and Properties of Chitosan-Modified Poly(vinyl acetate)“, J. Appl. Polym. Sci., Vol. 86, 3057-3063. (SCI) NSC 90-2313-B-032-001-
21. Trong-Ming Don, J.-F King, and Wen-Yen Chiu, 2002, “The Preparation of Chitosan- graft-Poly(vinyl acetate) and Their Adsorption of Copper Ion” Polym. J., vol. 34, no 6, 418-425. (SCI) NSC 90-2313-B-032-001-
22. Shih-Chang Hsu, Trong-Ming Don and Wen-Yen Chiu, 2002, “Free Radical Degradation of Chitosan with Potassium Persulfate”, Polymer Degradation and Stability, 75, 73-83. (SCI) NSC 89-2313-B-131-001-A24
23. Trong-Ming Don, Shih-Chang Hsu and Wen-Yen Chiu, 2001, “Structures and Thermal Properties of Chitosan-Modified Poly(Methyl Methacrylate)”, J. Polym. Sci., Part A: Polym. Chem., 39(10),1646-1655. (SCI) NSC 89-2313-B-131-001-A24
24. T. W. Cheng and J. G. Wu, 2001, “Modified Boundary Layer Resistance Model for Membrane Ultrafiltration,” Tamkang J. Science and Engineering, 4(2), 111-117.
25. T. W. Cheng and S. Y. Pan, 2001, “Recovery of Sizing Agent by gas Sparging Ultrafiltration,” J. Chin. Inst. Chem. Engrs., 32(5), 431-436. (SCI, EI)
26. T. W. Cheng and T. L. Lin, 2001, “Characteristics of Gas-Liquid Two-Phase Flow in Small Diameter Inclined Tubes,” Chem. Eng. Sci., 56(21-22), 6393-6398. (SCI, EI)
27. T. W. Cheng, 2002, “Influence of Inclination on Gas Sparged Cross-Flow Ultrafiltration through an Inorganic Tubular Membrane,” J. Membrane Sci., 196(1), 103-110. (SCI, EI)
28. T. W. Cheng and C. H. Su, 2002, “Influence of Flow Arrangement on the Performance of Membrane Mass Exchanger,” J. Chin. Inst. Chem. Engrs., 33(4), 389-396. (SCI, EI)
29. T. W. Cheng and C. Y. Huang, 2002, “Filtration Characteristics of the Rejected-Solute Layer in Dead-End Ultrafiltration,” J. membrane Sci., 209, 485-492. (SCI, EI)
30. T. W. Cheng and J. G. Wu, 2003, “Quantitative Flux Analysis of Gas-Liquid Two-Phase Ultrafiltration,” Sep. Sci. Technol., 38(4), 813-831. (SCI, EI)
31. Chang, C. L., 2002, “Pretreatment of Wastewater by Vacuum Freezing System in a Cool-Thermal Storage Process,” Separation and Purification

Technology, 26,165-176.

32. Chang, C. L., HO, C. D. and Yeh, H. M. 2002, ”Cool Thermal Storage Coupled with Water Treatment by Normal Freezing of Dilute Aqueous Solutions,” International communications in Heat and Mass Transfer, 29, 3, 413-422.
33. Chang, C. L. and Chang, M. S. 2002, “Preparation of Composite Membranes of Functionalised Silicone Polymers and PVDF for Pervaporation of Ethanal-Water Mixture,” Desalination, 148, 39-42.
34. Yu-Chi Chang, Kuang-Cheng Fan and Chun-I Lin, 2002, “Structural and Electrocatalytic Characteristics of Electrodeposited Nickel-Molybdenum Alloys” J. Chin. Inst. Chem. Engrs., vol. 33, pp.499-507.
35. George Ting-Kuo Fey, Wen-Hsiung Yo and Yu-Chi Chang, 2002, “Electrochemical characterization of LixNiyCo1-yO2 electrodes in a 1M LiPF6 solution of the ethylene carbonate-diethyl carbonate” J. of Power Sopurces, vol. 105, pp. 82-86.
36. George Ting-Kuo Fey, Kuan-Liang Chen and Yu-Chi Chang, 2002, “Effects of surface modification on the electrochemical performance of pyrolyzed suger carbons as anode materials for lithium-ion batteries” Materials Chemistry and Physics, vol. 76, pp. 1-6.
37. Yu-Chi Chang, Jin-Chen Yeh and Chun-I Lin, 2001, “ Process Characterization of Nickel-Chromium Alloy Electrodeposition by Statistical Analysis” J. Chin. Inst. Chem. Engrs., vol. 32, pp.351-359.
38. George Ting-Kuo Fey, Ming-Chih Hsieh and Yu-Chi Chang, 2001, “Mass transport and kinetic aspects of thionyl chloride reduction at the platinum microelectrode” J. of Power Sources, vol.97-98, pp.606-609.
39. George Ting-Kuo Fey, Wen-Kuei Liu and Yu-Chi Chang, 2001, “ Temperature and concentration effects on the conductivity of LiAlCl4/SOCl2 electrolyte solutions” J. of Power Sources, vol.97-98, pp.602-605.
40. Yu-Chi Chang, Jhy-Hwa Jong and George Ting-Kuo, 2001, “Kinetic Characterization of the Electrochemical Intercalation of Lithium Ions into Graphite Electrodes ” J. of The Electrochemical Society , vol.147, pp.2033-2038.