

## ★電漿與表面工程研究室

*Plasma and Surface Engineering Laboratory*

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### 重要服務

- 台灣鍍膜科技協會第九屆常務理事 2015/12/19~2017/12/18
- Chair, Symposium G Surface Engineering - Applied research and industrial applications, [JCMCTF](#)
- Chair, Symposium B Nanostructured and nanocomposite coatings, [TACT2017](#)

### 研究生



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- 表面工程技術
- 奈米結構硬質鍍膜技術
- 真空電漿製程系統與電漿分析
- 生醫功能性鍍膜技術
- 高離化率真空陰極電弧源研製與磁場控制
- 離子植入技術

## 榮譽獲獎

1. 台灣鍍膜科技協會年會(TACT 2016)暨科技部專題計畫研究成果發表會/2 項海報論文佳作獎
2. 2015 年國立虎尾科技大學產學績優輔導顧問
3. 2015 年度國立虎尾科技大學教師學術研究績優獎
4. TACT2015 Thin Films International Conference/ The Excellence Prize of the Poster Award (國際會議海報優等論文獎)
5. TACT2015 Thin Films International Conference/ The Merit Prize of the Poster Award (國際會議海報佳作論文獎)
6. 台灣真空學會 2012 年度會員大會暨論文發表會/海報論文優等獎
7. TACT2011 International Thin Films Conference/ The Second Prize of the Poster Award (海報論文獎第二名)
8. TACT2011 International Thin Films Conference/ The Third Prize of the Poster Award (海報論文獎第三名)
9. 台灣鍍膜科技協會年會(TACT 2010) 暨國科會專題計畫研究成果發表會/海報論文優等獎

## 研究設備

- 陰極電弧沉積鍍膜系統(CAE) x 2
- 電漿光譜分析儀(OES) x1
- 快速退火熱處理爐(RTA) x 1
- 真空離子氮化系統/產學合作 x 1
- 電漿微弧氧化系統(PEO/MAO)/產學合作 x 1
- 高溫管型爐(1200 °C)/氣相沉積系統/產學合作 x 2
- 薄膜硬度與機械性質量測儀 x 1
- 洛式壓痕薄膜附著力試驗機 x 1
- 衝擊壓痕測試儀 x 2
- 球磨薄膜厚度量測儀 x 1

多功能光學顯微鏡 x 1

多功能刀具磨床 x 1

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## 學術交流

虎尾科大 薄膜工程聯盟中心 / 明道大學 表面工程研究中心 / 明志科大 薄膜

科技與應用中心 三校聯盟

中國醫藥大學 牙醫系

弘光科大 生醫工程系

德國TU Dortmund 工業大學 材料研究中心

德國RWTH Aachen University 阿亨大學 Surface Engineering Institute (IOT)

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## 研究計畫

年度	委託單位	計畫名稱	計畫編號	執行期間
94	國科會	陰極電弧沉積氮化鈦矽薄膜製程與機械性質分析	NSC 94-2218-E-451-005	94/10/1~ 95/7/31
94	國科會	氮化鋁鈦/氮化鉻奈米複合薄膜之磨潤性能研究	NSC 94-2622-E-451-002-CC3	94/11/1~ 95/10/31
95	國科會	陰極電弧沉積氮化鉻/氮化鈦矽奈米結構多層薄膜製程與機械性質分析	NSC 95-2221-E-451 -002	95/8/1~ 96/7/31
95	國科會	碳氧化鉻奈米複合鍍膜之機械性質與工具應用	NSC 95-2622-E-451 -002-CC3	95/11/1~ 96/10/31
96	國科會	科學工業園區人才培育補助計畫-奈米光電與真空技術實務模組課程	P0960095	97/2/1~ 98/7/31
97	國科會	陰極電弧沉積多元奈米結構多層薄膜製程與高溫機械性質分析	NSC 97-2221-E-451 -005	97/8/1~ 98/7/31
97	國科會	氮化鋁矽/氮化鉻多層鍍膜之抗衝擊性能研究	NSC 97-2622-E-451 -001-CC3	97/8/1~ 98/7/31

97	財團法人 精密機械 研究發展 中心	齒顎矯正器表面改質技術計畫案	P0970013	97/7/15~ 97/11/28
98	國科會	光學玻璃成型模具奈米結構多層薄膜製程與高溫特性研究	NSC 98-2221-E-451 -006	98/8/1~ 99/7/31
98	國科會	高硬度潤滑性TiAlCN薄膜之磨潤性能研究	NSC 98-2622-E-451 -002-CC3	98/7/1~ 99/6/30
99	財團法人 金屬工業 研究發展 中心	電漿強化化學氣相沉積矽基薄膜太陽能電池製程之電漿檢測系統設計	P0980166	99/3/1~ 99/10/31
99	產學合作	鈦基植體組件高性能真空鍍膜研製	P0980198	99/6/16~ 99/9/15
99	產學合作	PVD表面處理產學實驗線合作研究	P0980217	99/7/1~ 100/6/30
99	國科會	離子植入氮化鉻鋁矽鍍膜於碳化鎢光學玻璃成型模具之應用研究	NSC 99-2221-E-451 -005	99/8/1~ 100/7/31
99	國科會	純鈦植體材料漸層銦氮氧化物鍍膜之製備與應用研究	NSC 99-2622-E-451 -004 -CC3	99/6/1~ 100/5/31
99	國科會	高功率脈衝磁控濺鍍固態潤滑膜之研究與應用 [共同主持人]	NSC 99-2632-E-451-001-MY3	99/8/1~ 102/7/31
100	國科會	多層硬質鍍膜之衝擊性能與殘留應力之研究 [Project-Based Personnel Exchange Programme Between the NSC and DAAD, PPP]	NSC 100-2911-I-451-503	100/1/1~ 100/12/31
100	國科會	電磁控陰極電弧沉積氮化鈦矽/氮化鉻鋁多元奈米結構多層薄膜製程與機械性質分析	NSC 100-2221-E-150 -095	100/8/1~ 101/7/31
100	國科會	高硬度TiAlSiN硬質薄膜於鞋楦模具之切削應用研究	NSC 100-2622-E-150 -016 -CC3	100/6/1~ 101/5/31
101	國科會	物理氣相沉積奈米複合硬質鍍膜之機械性能研究 [Project-Based Personnel	NSC 101-2911-I-150-501	101/1/1~ 101/12/31

		<i>Exchange Programme Between the NSC and DAAD, PPP]</i>		
101	經濟部	高硬度耐腐蝕塗層之積體電路封裝模具專利商品化技術	10140045	101/7/6~ 101/11/20
101	國科會	多元氮化鋁鉻鈦矽奈米複合薄膜之製備及其機械性質與熱衝擊特性分析	NSC 101-2221-E-150 -032	101/8/1~ 102/7/31
101	國科會	高硬度奈米複合薄膜提升碳化鎢刀具於鈦合金之高速切削加工性能與刀具壽命應用研究	NSC 101-2622-E-150 -015 -CC3	101/6/1~ 102/5/31
102	國科會	脈衝電磁控陰極電弧沉積奈米複合硬質鍍膜之研究與產業聯盟應用(1/2)	NSC 102-2622-E-150 -001	102/2/1~ 103/1/31
102	產學合作	真空鍍膜設備共構合作研發	102AF07	102/3/16~ 103/3/15
102	產學合作	刀具設計與鍍膜技術基礎學理與分析建構[共同主持人]	102AF20	102/4/1~ 103/3/30
102	產學合作	低溫磁控濺鍍功能性鍍膜設備共構合作研發	102AF43	102/7/1~ 103/6/30
102	產學合作	新型脈衝真空磁控濺鍍設備設計與研製	102AF50	102/9/1~ 103/2/28
102	產學合作	學界協助中小企業科技關懷計畫--區域傳統產業技術及品質提升計畫(1)	102AR0741	102/9/1~ 102/11/30
102	產學合作	學界協助中小企業科技關懷計畫--區域傳統產業技術及品質提升計畫(2)	102AR0741	102/6/1~ 102/11/30
102	國科會	具韌性多元氮化鉻鋁矽鈦鈮奈米複合薄膜之製備及其機械性質分析	NSC 102-2221-E-150 -005 -MY2	102/8/1~ 104/7/31
102	國科會	鈦鋯合金植體材料漸層氮化鈦鋯與鈦鋯非晶碳複合鍍膜之製備與應用研究	NSC 102-2221-E-150 -006	102/8/1~ 103/7/31
102	產學合作	微型產學研究計畫-機械硬質陶瓷薄膜之抗高溫性能與機械性質分析		102/5/1~ 102/10/31
102	產學合作	微型產學研究計畫-新型硬質		102/11/1~

		薄膜碳化物刀具在鋁合金之高速切削應用		103/4/30
103	國科會	表面工程功能性鍍膜之工業化研究 [Project-Based Personnel Exchange Programme Between the NSC and DAAD, PPP]	NSC 103-2911-I-150-502	103/1/1~ 103/12/31
103	科技部	高硬度多元氮化鉻鋁矽鎢奈米複合薄膜提升碳化鎢刀具之高速切削加工性能應用研究	MOST 103-2622-E-150-011 -CC3	103/6/1~ 104/5/31
103	科技部	脈衝電磁控陰極電弧沉積奈米複合硬質鍍膜之研究與產業聯盟應用(2/2)	NSC 103-2622-E-150-001	103/2/1~ 104/1/31
103	產學合作	真空鍍膜設備共構合作研發-2	103AF50	103/11/01 ~ 104/10/31
103	產學合作	電漿氧化技術服務案	103AF57	103/11/01 ~ 104/1/31
103	產學合作	自動化高效率之新世代PVD生產設備規劃	103AF63	103/11/1 ~ 104/7/30
104	產學合作	加工鋁合7003金系列刀具鍍膜技術開發	104AF46	104/07/01 ~ 105/06/30
104	產學合作	FMC技術收集與人才培育	104AF20	104/04/16 ~ 104/10/15
104	科技部	脈衝磁控濺鍍漸層氧化鋅鍍膜之製備與抗菌性/細胞生物相容性分析	MOST 104-2221-E-150-003	104/08/01 ~ 105/07/31
104	產學合作	真空鍍膜設備共構合作研發-3	104AF112	104/12/01 ~ 105/11/30
105	科技部	奈米複合鍍膜之表面工程設計與應用 [Project-Based Personnel Exchange Programme Between the NSC and DAAD, PPP]	MOST 105-2911-I-150-501	105/1/1~ 105/12/31



105	科技部	介層優化氮化鋁鈦/氮化鈦硼 奈米多層硬質鍍膜之機械性 質研究	MOST 105-2221-E-150-003	105/08/01 ~ 106/07/31
105	產學合作	加工304&316不銹鋼系列刀 具鍍膜技術開發	105AF041	105/07/01 ~ 106/06/30
106	產學合作	先進物理鍍膜技術與鍍膜系 統設備開發深耕計畫	106AF006	106/01/01 ~ 106/06/30

## 研究發表

### 期刊論文

1. **Yin-Yu Chang\***, Shi-Yao Weng, Chun-Hsiao Chen, Fu-Xing Fu, “High Temperature Oxidation and Cutting Performance of AlCrN, TiVN and Multilayered AlCrN/TiVN Hard Coatings“, *Surface & Coatings Technology*. Accepted on 2017/06/06. (SCI). **MOST 103-2622-E-150-011 -CC3 and MOST 105-2221-E-150 -003. Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.**
2. Ming-Tzu Tsai, **Yin-Yu Chang\***, Heng-Li Huang, Yu-Hsuan Wu, Tzong-Ming Shieh, “Micro-arc oxidation treatment enhanced the biological performance of human osteosarcoma cell line and human skin fibroblasts cultured on titanium–zirconium films”, *Surface & Coatings Technology* 303A (2016) 268–276. *Publication date: 2016/10/15. (SCI). MOST 104-2314-B-039-043, MOST 104-2221-E-150-003, and MOST 103-2320-B-241-003. Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.*  
<https://doi.org/10.1016/j.surfcoat.2016.03.001>
3. **Yin-Yu Chang\***, Wen-Tung Chiu, Jui-Pin Hung, “Mechanical properties and high temperature oxidation of CrAlSiN/TiVN hard coatings synthesized by cathodic arc evaporation“, *Surface & Coatings Technology* 303A (2016) 18-24. *Publication date: 2016/10/15. (SCI). MOST*

**104-2314-B-039-043, MOST 104-2221-E-150-003, and MOST 103-2320-B-241-003.**

**Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.**

<https://doi.org/10.1016/j.surfcoat.2016.02.047>

4. Heng-Li Huang, **Yin-Yu Chang\***, Jia-Xu Liu, Ming-Tzu Tsai, Chih-Ho Lai, “Antibacterial Activity and Cell Compatibility of TiZrN, TiZrCN, and TiZr-amorphous Carbon Coatings”, *Thin Solid Films*, 596(2015)111-117. *Publication date: 2015/12/21. (SCI). NSC 102-2221-E-150-006 and MOST 104-2221-E-150-003. Impact factor= 1.867; Rank= 6/18 in Materials science, coatings & films.* <https://doi.org/10.1016/j.tsf.2015.09.082>
5. K. Bobzin, T. Brögelmann, R.H. Brugnara, M. Arghavani, T.S. Yang, **Y.Y. Chang**, S.Y. Chang, “Investigation on plastic behavior of HPPMS CrN, AlN and CrN/AlN-multilayer coatings using finite element simulation and nanoindentation”, *Surface & Coatings Technology* 284 (2015) 310–317. *Publication date: 2015/08/20. (SCI). Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.* <https://doi.org/10.1016/j.surfcoat.2015.07.081>
6. **Yin-Yu Chang\***, Heng-Li Huang, Hung-Jui Chen, Chih-Ho Lai, Chi-Yuan Wen, “Antibacterial Properties and Cytocompatibility of Tantalum Oxide Coatings”, *Surface & Coatings Technology*, 259B(2014)193–198. *Publication date: 2014/11/25. (SCI). NSC 102-2221-E-150-006 and NSC 101-2314-B-039-022-MY3. Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.* <https://doi.org/10.1016/j.surfcoat.2014.03.061>
7. **Yin-Yu Chang**, Heng-Li Huang, Ya-Chi Chen, Jui-Ting Hsu, Tzong-Ming Shieh, Ming-Tzu Tsai\*, “Biological Characteristics of the MG-63 Human Osteosarcoma Cells on Composite Tantalum Carbide/Amorphous Carbon Films”, *PLOS ONE*, 9(4):e95590. *Publication date: 2014/4/23. (SCI). NSC 101-2221-E-150-032. Impact factor= 3.534; Rank= 8/55 in Multidisciplinary Sciences.* <https://doi.org/10.1371/journal.pone.0095590>
8. Ming-Tzu Tsai, **Yin-Yu Chang\***, Heng-Li Huang, Ya-Chi Chen, Shun-Ping Wang, Chih-Ho Lai, “Biological Characteristics of Human Fetal Skin Fibroblasts and MG-63 Human Osteosarcoma Cells on Tantalum-doped Carbon Films”, *Surface & Coatings Technology*,



- 245(2014)16-21. *Publication date:* 2014/4/25. (SCI). NSC 102-2221-E-150-006, NSC 101-2314-B-039-022-MY3, TCVGH-HK1008008, and TCVGH-HK1028002. **Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.**  
<https://doi.org/10.1016/j.surfcoat.2014.02.025>
9. **Yin-Yu Chang\***, Hsing-Ming Lai, “Wear behavior and cutting performance of CrAlSiN and TiAlSiN hard coatings on cemented carbide cutting tools for Ti alloys”, *Surface & Coatings Technology*, 259(2014)152–158. *Publication date:* 2014/2/15. (SCI). NSC 102-2622-E-150-001 and NSC 102-2221-E-150-005-MY2. **Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.**
10. Heng-Li Huang, **Yin-Yu Chang\***, Hung-Jui Chen, Yu-Kai Chou, Chih-Ho Lai, Michael YC Chen, “Antibacterial Properties and Cytocompatibility of Tantalum Oxide Coatings with Different Silver Contents”, *Journal of Vacuum Science & Technology A (JVST A)*, 32(2014) 02B117-1~6. *Publication date:* 2014/2/6. (SCI). NSC 101-2221-E-150-032 and NSC 101-2622-E-150-001. **Impact factor= 2.140; Rank= 5/18 in Materials science, coatings & films.** <http://dx.doi.org/10.1116/1.4862543>
11. **Yin-Yu Chang\***, Hsing-Ming Lai, Ho-Yi Kao, “High temperature wettability of ion implanted multicomponent CrAlSiN films by molten glass”, *Surface & Coatings Technology*, 237(2013)164-169. *Publication date:* 2013/12/25. (SCI). NSC 101-2221-E-150 -032 and NSC 101-2622-E-150 -015-CC3. **Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.** <http://dx.doi.org/10.1016/j.surfcoat.2013.08.037>
12. Heng-Li Huang, **Yin-Yu Chang\***, Ya-Chi Chen, Chih-Ho Lai, Michael YC Chen, “Cytocompatibility and Antibacterial Properties of Zirconia Coatings with Different Silver Contents on Titanium”, *Thin Solid Films*, 549 (2013) 108-116. *Publication date:* 2013/12/31. (SCI). NSC 101-2221-E-150-032 and NSC 101-2314-B-039-022-MY3. **Impact factor= 1.867; Rank= 6/18 in Materials science, coatings & films.**  
<http://dx.doi.org/10.1016/j.tsf.2013.07.075>

13. **Yin-Yu Chang\***, Heng-Li Huang, Ya-Chi Chen, Jui-Ching Weng, Chih-Ho Lai, “Characterization and antibacterial performance of ZrNO-Ag coatings”, Surface & Coatings Technology, 231(2013)224-228. *Publication date: 2013/09/25. (SCI). NSC 99-2622-E-451-004-CC3 and NSC 100-2221-E-150 -095. Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.* <http://dx.doi.org/10.1016/j.surfcoat.2012.05.084>
14. **Yin-Yu Chang\***, Chih-Ming Cheng, Yau-Yi Liou, Wolfgang Tillmann, Fabian Hoffmann, Tobias Sprute, “High temperature wettability of multicomponent CrAlSiN and TiAlSiN coatings by molten glass”, Surface & Coatings Technology, 231(2013)24-28. *Publication date: 2013/09/25. (SCI). NSC 99-2221-E-451 -005 / NSC 100-2221-E-150 -095. Impact factor= 2.199; Rank= 4/18 in Materials science, coatings & films.* <http://dx.doi.org/10.1016/j.surfcoat.2012.04.050>
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