

## Kuo Po-Cheng (郭博成)

Professor

B.S. in Physics National Cheng Kung

University

M.S. in Physics National Cheng Kung

University,

Ph.D. in Electrical Engineering

### Research and Professional Interests

1. Magnetic materials
2. Thin films
3. Recording media

### Projects (started from 2010)

1. 超高記錄密度之奈米顆粒複合材料垂直磁紀錄薄膜的研製(國科會-98 年 8 月 1 日至 99 年 7 月 31 日止) Sponsored by National Science Council, NSC 98-2221-E-002-053-MY3, 98/8/1-99/7/31, NT\$960,000
2. 超越兆位元之關鍵儲存技術研發 3 年計畫(經濟部-97 年 7 月 1 日至 100 年 6 月 30 日止) Sponsored by Ministry of Economic Affairs of Taiwan, 97-EC-17-A-08-S1-006, 97/7/1-98/6/31, NT\$2,000,000

### SCI Papers

1. Fu-Te Yuan, An-Cheng Sun, Jen-Hwa Hsu, C. S. Tan, **P. C. Kuo**, W. M. Liao, and H. Y. Lee., "Coercivity enhancement in L11 Co50-XCuPt50 thin films", *Journal of Applied Physics*, 109, pp.07B714-1~3.(2011)
2. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, K. T. Huang, and S. C. Chen., "Effect of Film Thickness on Morphology and Magnetic Properties of CoPt Thin Films", *Nanoscience and Nanotechnology Letters*, 3, pp. 262–266.(2011)
3. S. C. Chen, T. H. Sun. C. L. Shen, W. C. Peng, C. D. Chen, **P. C. Kuo**, and J. R. Chen, "Microstructure and Magnetic Properties of in-situ deposited L10 FePt films on MgO(200) films of varying thickness", *IEEE Transactions on Magnetics*, 47, pp. 517 – 520.(2011)
4. C.L. Shen, **P.C. Kuo**, S.C. Chen, C.D. Chen, S.L. Hsu, G.P. Lin, S.L. Ou, K.T. Huang, "Effect of process parameters on the microstructure and perpendicular magnetic properties of Co<sub>3</sub>Pt thin films", *Thin Solid Films*, 519, pp. 5199-5202.(2011)
5. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, **P. C. Kuo**, and J. R. Chen, "Film thickness dependence of microstructures and magnetic properties in single-layered FePt Films by in situ annealing", *Thin Solid Films*, 519, pp. 6964-6968.(2011)
6. S. U. Jen, T. L. Tsai, **P. C. Kuo**, W. L. Chi, and W. C. Cheng, "Magnetic properties of Fe<sub>62</sub>Co<sub>19</sub>Ga<sub>19</sub> films deposited on Si(100) substrate", *Journal of Applied Physics*, 109, pp.07A920-1-07A920-3.(2011)

7. T. L. Tsai, S. U. Jen, **P. C. Kuo**, 2011, "High temperature Magnetic properties of Fe81-XCoXGa19/Si(100) films deposited on Si(100) substrate", *Journal of Applied Physics*, 109, pp.07A920-1-07A920-3.(2011)
8. Sin-Liang Ou, Po-Cheng Kuo, Shih-Hsien Ma, Chih-Long Shen, Wei-Tai Tang, and Don-YauChiang, "Crystallization mechanisms and recording characteristics of Si/CuSi bilayer for write-once blue-ray disc", *Appl. Phys. Lett.*, 99, 12, pp. 21908-21908(2011)
9. Sin-Liang Ou, **Po-Cheng Kuo**, Shu-Chi Sheu, Ger-Pin Lin, Tsung-Lin Tsai, Sheng-Chi Chen, Don-Yau Chiang, and Wei-Tai Tang, "Crystallization mechanisms of  $(In_{15}Sb_{85})_{100-x}Bi_x$  phase change recording thin film", *Materials and Design*, 31, pp.1688–1690.(2010)
10. G. P. Lin, **P. C. Kuo**, K. T. Huang, C. L. Shen, T. L. Tsai, Y. H. Lin, M. S. Wu, "Self-assembled nano-size FePt islands for ultra-high density magnetic recording media ", *Thin Solid Films*, 518, pp. 2167–2170. (2010)
11. S. U. Jen, T. L. Tsai, **P. C. Kuo**, W. L. Chi, and W. C. Cheng, "Magnetostrictive and structural properties of FeCoGa films", *Journal of Applied Physics*, 107, pp.013914-1-013914-3. (2010)
12. K. T. Huang, **P. C. Kuo**, G. P. Lin, C. L. Shen and Y. D. Yao, "Formation and magnetization reversal mechanisms of nano-size Fe arrays prepared on anodic aluminum oxide templates ", *Thin Solid Films*, 518 , pp. 5300-5303. (2010)
13. S. C. Chen, **P. C. Kuo**, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, and W.H. Hong, "Effect of capped layer on microstructure and magnetic properties of FePt films ", *Materials and Design*, 31, pp. 1742-1745. (2010)
14. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu, and T. H. Sun, "Magnetic properties and microstructures of sputtered epitaxial Co-rich Co-Pt films", *Materials and Design*, 31, pp. 1706-1710. (2010)
15. Sin-Liang Ou, **Po-Cheng Kuo**, Shu-Chi Sheu, Ger-Pin Lin, Tsung-Lin Tsai, Wei-Tai Tang, and Don-Yau Chiang, "Effects of Zn Doping on the  $In_{15}Sb_{85}$  Phase Change Recording Thin Films ", *IEEE Xplore*, pp.694-695. (2010)
16. Sin-Liang Ou, **Po-Cheng Kuo**, Shih-Hsien Ma, Chih-Long Shen, Wei-Tai Tang, and Don-YauChiang, "Microstructure and Thermal Properties of Phase Change  $(GeSbSn)_{100-x}Co_x$  Optical Recording Films",*IEEE Xplore*, pp.1216-1217. (2010)
17. C. L. Shen, **P. C. Kuo**, Y. S. Li, G. P. Lin, S. L. Ou, K. T. Huang and S. C. Chen, "Thickness dependence of microstructures and magnetic properties for CoPt/Ag nanocomposite thin films," *Thin Solid Films*, 518, pp.7356-7359. (2010)

18. K. T. Huang, **P. C. Kuo**, G. P. Lin, C. L. Shen and Y. D. Yao, "Tiltable magnetic anisotropy in oblique-deposited Fe arrays using nanoporous ANO", *Journal of Applied Physics*, 108, pp.084318-1~084318-4. (2010)
19. Fu-Te Yuan, An-Cheng Sun, Jen-Hwa Hsu, C. S. Tan, **P. C. Kuo**, W. M. Liao, and H. Y. Lee, "Enhancement of perpendicular coercivity in L11 CoPt thin films by replacement of Co with Cu", *Journal of Applied Physics*, 108, pp.113909-1~ 113909-4. (2010)
20. G. P. Lin, **P. C. Kuo**, P. L. Lin , K. T. Huang, C. L. Shen, T. L. Tsai, S. L. Ou, S. C. Chen, "Magnetic properties and microstructure of TbCo/(SiN<sub>x</sub>/Co)<sub>n</sub> films", *Materials and Design*, 31, pp.1734–1736.(2010)
21. Y. H. Fang, **P. C. Kuo**, S. C. Chen, and G. P. Lin, "Alternate monatomic layer deposited L10 FePt (001) with high coercivity and small grain size", *Thin Solid Films*, 517, pp.5185–5188.(2009)
22. Y. H. Fang, **P. C. Kuo**, A. C. Sun, and S. C. Chen, "Microstructure and Magnetic Properties of FePt-SiNx Thin Films", *Thin Solid Films*, 517, pp. 5181–5184. (2009)
23. Y. H. Fang, **P. C. Kuo**, and G. P. Lin, "Exchange interaction effect of TbCo/FePt bilayers", *Journal of Magnetism and Magnetic Materials*, 321, pp.1863–1866. (2009)
24. S. C. Chen, S. P. Chen, and **P. C. Kuo**, "L10 FePt thin films with high coercivity and fine grain by rapid thermal annealing with high heating ramp rate", *Thin Solid Films*, 517, pp.5176-5180. (2009)
25. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu, Y. H. Fang, G. P. Lin, and K. T. Huang, "High perpendicular hard magnetic properties of nanocomposite Co-rich Co-Pt/Pt double-layered films by epitaxial deposition without capped layer", *Thin Solid Films*, 517, pp.5018-5022. (2009)
26. S. C. Chen, **P. C. Kuo**, S. L. Hsu, G. P. Lin, S. L. Ou, and T. H. Sun, "Granular Co<sub>3</sub>Pt thin films with perpendicular hard magnetic properties for perpendicular magnetic recording media," *IEEE Transactions on Magnetics*, 45, pp.2280-2283. (2009)
27. Kai-Tze Huang, **Po-Cheng Kuo**, Yeong-Der Yao, "Formation of Pt nanorods on nanoporous anodic aluminum oxides by controlled nucleation sites", *Thin Solid Films*, 517, pp. 3243-3247. (2009)
28. S. C. Chen, T. Y. Kuo, Y. C. Lin, and **P. C. Kuo**, "Fabrication of (200)-textured NiO films on glass substrate using radiofrequency sputtering", *Advanced Materials Research*, 47-50, pp.859-862. (2009)

29. A. C. Sun, F. T. Yuan, J. H. Hsu, Y. H. Lin, and **P. C. Kuo**, "Magnetic reversal behaviors of perpendicular exchange-coupled Fe/FePt bilayer films", *IEEE Transactions on Magnetics*, 45, pp.2709-2715. (2009)
30. Shien-Wen Wang, A. C. Sun, Fu-Te Yuan, Jen-Hwa Hsu, and **Po-Cheng Kuo**, "Formation of ordered FePt(001) texture with reduced diffusion length", *IEEE Transactions on Magnetics*, 45, pp.3580-3583.(2009)
31. K. T. Huang, **P. C. Kuo**, and Y. D. Yao, "Self-assembled Fe/Pt bilayered arrays on nanoporous anodic aluminum", *Solid State Communications*, 149, pp.2235-2239. (2009)
32. S. L. Ou, **P. C. Kuo**, P. L. Lin, Y. H. Fang, G. P. Lin and S. C. Chen, "Effect of SiN<sub>x</sub> capped layer on the microstructure and magnetic properties of CoPt/Ag thin films", *IEEE Transaction on Magnetics*, 45, pp.2679-2681. (2009)
33. T. H. Wu, **P.C. Kuo**, S. L. Ou, Jung-Po Chen, Po-Fu Yen, Tzuan-Ren Jeng, Chih-Yuan Wu, and Der-Ray Huang, "Diffusion and crystallization mechanisms of Ge/Au bilayer media for write-once optical disk", *Appl. Phys. Lett.*, 92, pp.011126-1~011126-3. (2008)
34. An-Cheng Sun, Jen-Hwa Hsu, **P. C. Kuo**, and H. L. Huang, "Onset of hard magnetic L10 FePt phase with (001) texture", *Thin Solid Films*, 516, pp.1155–1159 . (2008)
35. Y. H. Fang, **P. C. Kuo**, P. L. Lin, C. T. Kuo, G. P. Lin, and S. C. Chen, "Microstructure and Magnetic Properties of CoPt- Si<sub>3</sub>N<sub>4</sub>/Ag Thin Films", *Journal of Applied Physics*, 103, pp.07F514-1~07F514-3.(2008)
36. Y. H. Fang, **P. C. Kuo**, S. C. Chen, P. L. Lin, and C. T. Kuo, "Magnetic Properties of CoPt-Si<sub>3</sub>N<sub>4</sub>/Ag Nanocomposite Films", *Journal of Magnetism and Magnetic Materials*, 320, pp.3032–3035. (2008)
37. G. P. Lin, S. C. Chen, **P. C. Kuo**, P.L. Lin, K.T. Huang, Y.H. Fang, "Effect of Co layer thickness on the magnetic properties of Tb<sub>30</sub>Co<sub>70</sub>/SiNx/Co thin films", *Journal of Magnetism and Magnetic Materials*, 320, pp.3117–3119. (2008)
38. A. C. Sun, Y. C. Tsai, Jen-Hwa Hsu, **P. C. Kuo**, H. L. Huang, "Comparative evaluation of performance of percolated perpendicular media using FePt–MgO/Pt/Cr trilayer and FePt–MgO/MgO bilayer", *Journal of Magnetism and Magnetic Materials*, 320, pp.3169–3173. (2008)
39. An-Cheng Sun, Y. C. Tsai, Fu-Te Yuan, Jen-Hwa Hsu, and , **P. C. Kuo**, "Effect of MgO Addition on Structural and Magnetic Properties of (001)-Textured FePt Thin Films", *IEEE Trancations on Magnetics*, 320, pp. 3531–3534. (2008)
40. A.C. Sun, Jen-HwaHsu, **P. C. Kuo**, H.L.Huang, "Microstructural and magnetic studies of L10 FePt–SiO<sub>2</sub> nano-composite thin film with columnar structure for

- perpendicular magnetic recording”, *Journal of Magnetism and Magnetic Materials*, 320, pp. 3071–3074. (2008)
- 41. S. C. Chen, **P. C. Kuo**, C. T. Lee, A. C. Sun, C. Y. Chou, and Y. H. Fang, “Effects of CrRu underlayer and CrRu capped layer on the microstructure and magnetic properties of FePt films”, *IEEE Transactions on Magnetic*, 43, 876-878. (2007)
  - 42. T. H. Wu, **P. C. Kuo**, E. F. Tsai, D. Y. Chiang, W. T. Tang, T. R. Jeng, R. P. Cheng, W. C. Hsu, D. R. Huang, and S. C. Chen, “GeCu thin films for inorganic write-once media”, *IEEE Transactions on Magnetic*, 43, 856-858. (2007)
  - 43. T. H. Wu, **P. C. Kuo**, Y. H. Fang, J. P. Chen, P. F. Yen, T. R. Jeng, C. Y. Wu, and D. R. Huang, “Microstructure and recording mechanism of Ge/Au bilayer media for write-once optical disc”, *Applied Physics Letters*, 90, Art. No. 151111. (2007)
  - 44. A. C. Sun, J. H. Hsu, **P. C. Kuo**, and H. L. Huang, “Magnetic properties of percolated perpendicular FePt-MgO films”, *IEEE Transactions on Magnetic*, 43, 2130-2132. (2007)
  - 45. Y. H. Fang, **P. C. Kuo**, C. Y. Chou, S. C. Chen, N. W. Cheng, and P. L. Lin, “Magnetic properties of TbFeCo film with Ag under-layer”, *Journal of Magnetism and Magnetic Materials*, 310, E930-E932 Part3. (2007)
  - 46. S. C. Chen, **P. C. Kuo**, A. C. Sun, C. Y. Chou, Y. H. Fang, and C. T. Lee. “Largely enhanced coercivity of FePt film at low temperature by introduction of CrRu underlayer”, *Journal of Magnetism and Magnetic Materials*, 310, E921-E923 Part3. (2007)
  - 47. A. C. Sun, J. H. Hsu, **P. C. Kuo**, H. L. Huang, H. C. Lu, and S. F. Wang, “Thickness limit in perpendicular magnetic anisotropy L1(0) FePt(001) thin film”, *Journal of Magnetism and Magnetic Materials*, 310, 2650-2652 Part3. (2007)
  - 48. C. Y. Chou, Y. D. Yao, **P. C. Kuo**, K. W. Cheng, C. Yu, and S. C. Chen, “Microstructure and magnetoresistance of MgO thin film with CoFeB and CoFeC underlayers”, *Journal of Magnetism and Magnetic Materials*, 310, 2245-2247 Part3. (2007)
  - 49. An-Cheng Sun, Jen-Hwa Hsu, C. H. Sheng, **P. C. Kuo**, and H. L. Huang, "Grain size reduction by doping Cr underlayer with Ru for longitudinal magnetic recording media", *IEEE Trancations on Magnetics*, 43, pp.882-884. (2007)
  - 50. Sin-Liang Ou, **Po-Cheng Kuo**, and Shu-Chi Sheu, " Optical properties of nanostructure ( $In_{15}Sb_{85}$ )<sub>100-x</sub>Zn<sub>x</sub> thin films ", *physica status solidi (c)*, 4, No. 12, pp. 4441-4444. (2007)

51. An-Cheng Sun, Y. C. Tsai, Jen-Hwa Hsu, **P. C. Kuo**, and H. L. Huang, "Percolated perpendicular medium of FePt-MgO/MgO bilayer films for ultra-high magnetic recording", *physica status solidi (c)*, 4, pp. 4487-4492. (2007)

#### Non-SCI Papers

1. C. L. Shen, **P. C. Kuo**, Y. S. Li, G. P. Lin, K. T. Huang, S. L. Ou, and S. C. Chen, "Effect of Ag Underlayer on Microstructures and Perpendicular Magnetic Properties of CoPt Nanocomposite Thin Films", *Journal of Nanoscience and Nanotechnology*, 11, pp.1–5(2011)
2. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, S. L. Ou, and S. C. Chen, " Effect of Thicknesses on the Microstructure and Magnetic Properties of CoPt Thin Films ", *Advanced Materials Research*, 123-125, pp. 655-658.(2010)
3. C. L. Shen, T. H. Sun, C. L. Chang, S. C. Chen, G. P. Lin, K. T. Huang, S. L. Ou and **P. C. Kuo**, " Magnetic Properties of Single-Layered  $Fe_{100-x}Pt_x$  Films by Rapid Thermal Annealing ", *Advanced Materials Research*, 123-125, pp. 723-726.(2010)
4. S. C. Chen, T. H. Sun, and **P. C. Kuo**, "Effect of annealing on magnetic properties and domain structures of FePt thin films by rapid thermal annealing technique ", *Advanced Materials Research*, 47-50, pp.911-914.(2009)
5. S. C. Chen, T. H. Sun, T. Y. Kuo, and **P. C. Kuo**, "Preparation and magnetic properties studies of granular FePt composite films for high-density magnetic recording ", *Advanced Materials Research*, 47-50, pp.855-858.(2009)
6. G. P. Lin, **P. C. Kuo**, Y. H. Fang, S. L. Ou, and S. C. Chen, "Exchange effect in TM-TbCo/RE-TbCo Double Layer films " *Advanced Materials Research*, Vols. 47-50, pp 781-784.(2008)
7. G. P. Lin, **P. C. Kuo**, P. L. Lin, Y. H. Fang and K. T. Huang, " Magnetic properties of TbCo/(SiN<sub>x</sub>/Co)n films", *Advanced Materials Research*, Vols. 47-50, pp 785-788.(2008)
8. Sin-Liang Ou, **Po-Cheng Kuo**, Shu-Chi Sheu, Chih-Hsiang Hsiao, Don-Yau Chiang, and Wei-Tai Tang, "Effects of Bi doping on the In<sub>15</sub>Sb<sub>85</sub> phase change recording thin film", *Advanced Materials Research*, Vols. 47-50, pp.813-816(2008)
9. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, and S. L. Hsu, "Microstructures and magnetic properties of sputtered epitaxial Co<sub>3</sub>Pt/Pt multilayer films", *Advanced Materials Research*, 47-50, pp.583-587.(2008)
10. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, K. T. Huang, and G. P. Lin, "Microstructures and magnetic properties of nanocomposite FePt multilayer films", *Advanced Materials Research*, 47-50, pp.579-582.(2008)

11. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, K. T. Huang, G. P. Lin and W. H. Hong, "Effect of N<sub>2</sub>partial pressure on the microstructure and texture of MgO films deposited by rf-magnetron sputtering“, *Advanced Materials Research*, 47-50, pp.588-591.(2008)
12. T. H. Wu, **P.C. Kuo**, Jung-Po Chen, Po-Fu Yen, Tzuan-Ren Jeng, Chih-Yuan Wu, and Der-Ray Huang,“Ge/Al bilayer thin film for optical write-once media”, *The society of photo-optical instrument engineers (SPIE)*, 6620, pp. E6202-E6202. (2007)

### **International Conference Papers**

1. C. L. Shen, **P. C. Kuo**, T. Y. Huang, and S. C. Chen, "Effect of ZnO Additive on Microstructures and Magnetic Properties of CoPt Thin Films with Ag Underlayer“, International Conference on Materials for Advance Technology, Suntec, Singapore, p. A-0665.(2011/6/29-7/1)
2. C. L. Shen, **P. C. Kuo**, T. Y. Huang, and S. C. Chen, "Microstructures and magnetic properties of single-layered Fe100-xPtx films by rapid thermal annealing“, International Conference on Materials for Advance Technology, Suntec, Singapore, p. A-2121.(2011/6/29-7/1)
3. C. L. Shen, **P. C. Kuo**, T. Y. Huang, and S. C. Chen, "Effects of annealing parameters on magnetic properties and domain structures of FePt thin films by rapid thermal annealing technique“, International Conference on Materials for Advance Technology, Suntec, Singapore, p.A-2112.(2011/6/29-7/1)
4. C. L. Shen, **P. C. Kuo**, T. Y. Huang, and S. C. Chen, "Effect of SiC Additive on Microstructures and Magnetic Properties of FePt Thin Films“, International Conference on Materials for Advance Technology, Suntec, Singapore, p.A-0666.(2011/6/29-7/1)
5. Sheng-Chi Chen, Wei-Hsiang Su, Ta-Huang Sun, Chu-Lung Shen, Sin-Liang Ou, and **Po-Cheng Kuo**, “Effect of Pt content on structure and magnetic properties of single-layered Fe100-xPtx films by rapid thermal annealing”, The 11th International Symposium on Sputtering and Plasma Processes (ISSP2011), Kyoto, Japan, p.TF P2-15.(2011)
6. S. C. Chen, T. H. Sun, and **P. C. Kuo**, “Microstructures and magnetic properties of L10 FePt films deposited onto NaCl-type films”, 56th Annual Conference on Magnetism and Magnetic Materials, Scottsdale, Arizona, U.S.A., p.DP-01.(2011)
7. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu, G. P. Lin, S. L. Ou, and K. T. Huang, "Effect of Process Parameters on Perpendicular Coercivity of Co<sub>3</sub>Pt Thin Films“, 2010 IEEE International NanoElectronics Conference (INEC), City University of Hong Kong, Hong Kong, p.FP223. (2010/1/3-8)

8. C. L. Shen, **P. C. Kuo**, Y. S. Li, G. P. Lin, K. T. Huang, and S. C. Chen, "Enhancement of Ordering and Perpendicular Magnetic Properties of CoPt Films by adding Ag Underlayer", 2010 IEEE International NanoElectronics Conference (INEC), City University of Hong Kong, Hong Kong, p.FP232. (2010/1/3-8)
9. Sin-Liang Ou, **Po-Cheng Kuo**, Shih-Hsien Ma, Chih-Long Shen, Wei-Tai Tang, Don-YauChiang, and Chao-Te Lee, "Microstructure and Thermal Properties of Phase Change  $(\text{GeSbSn})_{100-x}\text{Co}_x$  Optical Recording Films", 2010 IEEE International NanoElectronics Conference (INEC), City University of Hong Kong, Hong Kong, p.EP407. (2010/1/3-8)
10. S. C. Chen, T. H. Sun, C. L. Chang, W. H. Hong, and **P. C. Kuo**, "Microstructures and Magnetic Properties of Single-layered FePt Films by in situ Annealing", 2010 IEEE International NanoElectronics Conference (INEC), City University of Hong Kong, Hong Kong, p.EP408. (2010/1/3-8)
11. G. P. Lin, **P. C. Kuo**, K. T. Huang, S. L. Ou, C. L. Shen, T. L. Tsai, and S. C. Chen, "Fabrication of FePt Nano-Islands Films for Ultra-High Density Magnetic Recording Media", IEEE International NanoElectronics Conference (INEC) 2010, City University of Hong Kong, p.FP237. (2010/1/3-8)
12. C. L. Shen, **P. C. Kuo**, G. P. Lin, T. Y. Huang, K. T. Huang, and S. C. Chen, "Enhancement of Ordering Degree and Perpendicular Magnetic Properties of CoPt Thin Films by Adding ZnO Underlayer", The 5<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, China, NNF, Paper ID: 4258. (2010/7/11-14)
13. S. C. Chen, T. Y. Kuo, Y. C. Lin, and **P. C. Kuo**, "Influences of process parameters on texture and microstructure of NiO films", The 5th International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, China, NNF, Paper ID:4439. (2010/7/11-14)
14. S. C. Chen, Y. C. Lin, T. Y. Kuo, and **P. C. Kuo**, "Preparation and properties of transparent conductive nickel oxide films", The 5<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, China, NNF, Paper ID:4442. (2010/7/11-14)
15. C. L. Shen, **P. C. Kuo**, S. C. Chen, C. D. Chen, S. L. Hsu, G. P. Lin, S. L. Ou, and K. T. Huang, "Effect of Process Parameters on the Microstructure and Perpendicular Magnetic Properties of  $\text{Co}_3\text{Pt}$  Thin Films", The 5<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, China, NNF, Paper ID:4449. (2010/7/11-14)
16. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, and **P. C. Kuo**, "Nonepitaxially grown single-layered FePt Films with

- perpendicular magnetic anisotropy“, The 5<sup>th</sup>International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, Chain, NNF, Paper ID:4480. (2010/7/11-14)
- 17. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, and **P. C. Kuo**, "Influence of annealing on the magnetic properties and domain structures of FePt films by rapid thermal annealing“, The 5<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010), Harbin, Chain, NNF, Paper ID: 4481(2010/6/11-14)
  - 18. G. P. Lin, **P. C. Kuo**, C. L. Shen, K. T. Huang, S. C. Chen, S. L. Ou, “Microstructure and magnetic properties of FePt films on amorphous glass substrate,” 10<sup>th</sup> Asia-Pacific Conference on Plasma Science and Technology (APCPST), Jeju, Korea, p.481(2010)
  - 19. G. P. Lin, **P. C. Kuo**, C. L. Shen, S. C. Chen, K. T. Huang, “Effect of Ag additive on the CoPt-SiN<sub>x</sub>/Ag granular thin films,” 10th Asia-Pacific Conference on Plasma Science and Technology (APCPST), Jeju, Korea, p.519(2010)
  - 20. C. L. Shen, **P. C. Kuo**, G. P. Lin, T. Y. Huang, C. M. Wang, M. H. Cheng, S. C. Chen, “Enhancement in Perpendicular Magnetic Properties of CoPt Films Deposited on ZnO Underlayer,” 10<sup>th</sup> Asia-Pacific Conference on Plasma Science and Technology (APCPST), Jeju, Korea, p 340(2010)
  - 21. C. L. Shen, **P. C. Kuo**, G. P. Lin, T. Y. Huang, S. C. Chen, C. M. Wang, J. A. Ke, “Microstructure and Magnetic Properties of CoPt-ZnO/Ag Thin Films,” 10<sup>th</sup> Asia-Pacific Conference on Plasma Science and Technology (APCPST), Jeju, Korea, p 252(2010)
  - 22. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, K. T. Huang, S. C. Chen, “CoPt thin films with nano-island structure for ultra-high density magnetic recording media”, International Symposium on Advanced Magnetic Materials and Applications (ISAMMA), Sendai, Japan, p.RD-06. (2010)
  - 23. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, **P. C. Kuo**, “Effect of annealing on coercivity and microstructure of FePt films by rapid thermal annealing technique”, International Symposium on Advanced Magnetic Materials and Applications (ISAMMA), Sendai, Japan, p.SF-04(2010)
  - 24. G. P. Lin, **P. C. Kuo**, C. L. Shen, S. C. Chen and K. T. Huang, “Effect of Fe capping layer on the magnetic properties of nano-size FePt island films”, International Symposium on Advanced Magnetic Materials and Applications (ISAMMA), Sendai, Japan, p.RD-13(2010)
  - 25. G. P. Lin, **P. C. Kuo**, C. L. Shen, K. T. Huang, S. C. Chen, and M. H. Cheng, “The study of magnetic properties and microstructure of nano-size FePt islands

- on amorphous carbon film”, 18th International Vacuum Congress (IVC-18), Beijing, China, p. 0bd232b9-6. (2010)
- 26. G. P. Lin, **P. C. Kuo**, C. L. Shen, K. T. Huang, S. C. Chen, C. M. Wang, and S. T. Chen, “Effect of Ag additive on magnetic properties and microstructure of the CoPt-SiN<sub>x</sub>/Ag granular thin films”, 18<sup>th</sup>International Vacuum Congress (IVC-18), Beijing, China, p.3570059a-5(2010)
  - 27. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, S. L. Ou, and S. C. Chen, “Effect of thicknesses on the microstructure and magnetic properties of CoPt thin films”, The 3rd International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1056(2010)
  - 28. C. L. Shen, **P. C. Kuo**, S. C. Chen, C. D. Chen, S. L. Hsu, G. P. Lin, and K. T. Huang, “Co<sub>3</sub>Pt nanocomposite films for perpendicular magnetic recording media”, The 3<sup>rd</sup> International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1492. (2010)
  - 29. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, S. L. Ou, K. T. Huang, and **P. C. Kuo**, “Magnetic properties of single-layered Fe<sub>100-x</sub>Pt<sub>x</sub> films by rapid thermal annealing,” The 3<sup>rd</sup> International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1116(2010)
  - 30. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, K. T. Huang, S. L. Ou, and S. C. Chen, “Effect of Film Thickness on Mophology and Magnetic Properties of CoPt Thin Films”, The 5th International Conference on Technological Advances of Thin Films & Surface Coatings, Harbin, China, p.NNF 4265(2010)
  - 31. C. L. Shen, **P. C. Kuo**, G. P. Lin, T. Y. Huang, S. L. Ou, T. L. Tsai, and S. C. Chen, “Effect of ZnO Addition on the Microstructure and Magnetic Properties of CoPt Thin Films with Ag Underlayer”, International Union of Materials Research Societies - International Conference on Electronic Materials, p.K-P-02(2010)
  - 32. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, **P. C. Kuo**, “Film thickness dependence of magnetic anisotropy and magnetic properties in FePt Films by in situ annealing”, Asia-Pacific Conference on Plasma Science and Technology, Jeju, Korea, p.2010-241. (2010)
  - 33. S. C. Chen, T. H. Sun, C. L. Chang, C. L. Shen, G. P. Lin, K. T. Huang, S. L. Ou, **P. C. Kuo**, “Magnetic Properties and Microstructures of Single-layered Fe<sub>100-x</sub>Pt<sub>x</sub> Films by in-situ annealing”, 18<sup>th</sup>International Vacuum Congress (IVC-18), Beijing, China, p.3f9fb4b0-a(2010)
  - 34. C. L. Shen, **P. C. Kuo**, G. P. Lin, Y. S. Li, J. A. Ke, S. T. Chen, and S. C. Chen, “Microstructure and Magnetic Properties of Nano-Island CoPt Thin

- Films”, 18<sup>th</sup> International Vacuum Congress, Beijing, China, p.6230dcd7-8. (2010)
- 35. C. L. Shen, **P. C. Kuo**, G. P. Lin , T. Y. Huang, J. A. Ke, C. M. Wang, and S. C. Chen, 2010, “Effect of ZnO Underlayer on the Microstructure and Magnetic Properties of CoPt Thin Films”, 18<sup>th</sup> International Vacuum Congress, Beijing, China, p.a69e681a-7. (2010)
  - 36. C. L. Shen, **P. C. Kuo**, G. P. Lin , Y. S. Li, C. M. Wang , M. H. Cheng, and S. C. Chen, “Effect of Ag Underlayer on the Microstructure and Magnetic Properties of CoPt Thin Films”, 18<sup>th</sup> International Vacuum Congress, Beijing, China, p.9989fdc9-9. (2010)
  - 37. C. L. Shen, **P. C. Kuo**, G. P. Lin, T. Y. Huang, C. M. Wang , S. T. Chen, and S. C. Chen , “Microstructure and Magnetic Properties of CoPt-ZnO/Ag Nanocomposite Films”, 18<sup>th</sup> International Vacuum Congress, Beijing, China, p.78f80343-6. (2010)
  - 38. Sin-Liang Ou, **Po-Cheng Kuo**, Shih-Hsien Ma, Chih-Long Shen, Don-yau Chiang, Wei-Tai Tang, “Microstructure and Crystallization Mechanism of  $(\text{GeSbSn})_{100-x}\text{Fe}_x$  Phase Change Optical Recording Films”, The 3<sup>rd</sup> International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p. P\_1081. (2010)
  - 39. Sin-Liang Ou, **Po-Cheng Kuo**, Chih-Hsiang Hsiao, Donyau Chiang, Chao-Te Lee, Wei-Tai Tang, “Microstructure and Magnetic Properties of Nano-Island CoPt Thin Films”, The 3rd International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1082. (2010)
  - 40. Sin-Liang Ou, **Po-Cheng Kuo**, Donyau Chiang, Wei-Tai Tang, Kuan-Lan Fan, Chao-Te Lee, “Microstructure and optical property of In-Ge-Sb-Sn-Te phase change optical recording thin films”, The 3<sup>rd</sup> International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1228. (2010)
  - 41. Sin-Liang Ou, **Po-Cheng Kuo**, Donyau Chiang, Chin-Yen Yeh, Shih-Hsien Ma, Wei-Tai Tang, “GeCu/Si Bilayer Thin Films for Write-Once Blue Laser Optical Recording Media”, The 3<sup>rd</sup> International Conference on Multi-Functional Materials and Structures, Jeonju, Korea, p.P\_1459. (2010)
  - 42. C. L. Shen, **P. C. Kuo** , G. P. Lin , Y. S. Li, “Thickness dependence of magnetic properties for CoPt thin films with nano-island structure”, Asia-Pacific Data Storage Conference, Hualien, Taiwan, p.PA-3 (2010/10/27-29)
  - 43. S. C. Chen, T. H. Sun, C. L. Chang, W. C. Peng, C. L. Shen, **P. C. Kuo**, “Microstructure and magnetic properties of in-situ deposited L10 FePt films on MgO(200) films of varying thickness”, Asia-Pacific Data Storage Conference, Hualien, Taiwan, p.PA-8(2010/10/27-29)

44. S. C. Chen, T. H. Sun, C. L. Chang, W. H. Su, C. L. Shen, **P. C. Kuo**, "Effect of substrate temperature on texture and magnetic properties of single-layered FePt films by in-situ annealing", Asia-Pacific Data Storage Conference, Hualien, Taiwan, p.PA-9(2010/10/27-29)
45. C. L. Shen, **P. C. Kuo**, G. P. Lin, K. T. Huang, T. L. Tsai, Y. H. Lin, S. C. Chen, "Surface energy effect of substrate/under-layer on phase transition and microstructure of FePt thin films", Asia-Pacific Data Storage Conference, Hualien, Taiwan, p.PA-10(2010/10/27-29)
46. S. L. Ou, **P. C. Kuo**, D.hang, W. T. Tang, C. Y. Yeh, "GeCu/Si Bilayer Thin Films for Write-Once Blue Laser Optical Recording Media", International Symposium on Optical Memory 2010 (ISOM'2010), Hualien, Taiwan, p.Tu-H-21(2010/10/24-28)
47. Sin-Liang Ou, **Po-Cheng Kuo**, Shu-Chi Sheu, Ger-Pin Lin, Tsung-Lin Tsai, Wei-Tai Tang, and Don-Yau Chiang, " Effects of Zn Doping on the In<sub>15</sub>Sb<sub>85</sub> Phase Change Recording Thin Films ", 2010 IEEE International NanoElectronics Conference (INEC), City University of Hong Kong , Hong Kong, p.EP230. (2010/1/3-8)
48. F. Yuan, A. Sun, J. Hsu, C. Tan, **P. C. Kuo**, W. Liao and H. Lee, "Coercivity enhancement in Co<sub>50-x</sub>Cu<sub>x</sub>Pt<sub>50</sub> L11 thin films", 55<sup>th</sup> Annual Conference on Magnetism and Magnetic materials, Atlanta , Georgia, U.S.A. p.AF-08. (2010)
49. T. Tsai, S. Jen and **P. C. Kuo**, "High Temperature Magnetic Properties of Fe<sub>81-x</sub>Co<sub>x</sub>Ga<sub>19</sub>/Si(100) Films", 55<sup>th</sup> Annual Conference on Magnetism and Magnetic materials, Atlanta , Georgia, U.S.A. p.AS-04. (2010)
50. S. Jen, T. Tsai, M. Li, **P. C. Kuo**, and M. Lin, "Magnetic properties of Fe<sub>62</sub>Co<sub>19</sub>Ga<sub>19</sub> films deposited on Si(100) substrates", 55<sup>th</sup> Annual Conference on Magnetism and Magnetic materials, Atlanta , Georgia, U.S.A. p.GS-03. (2010)
51. Shien-Wen Wang, A. C. Sun, Fu-Te Yuan, Jen-Hwa Hsu, and **Po-Cheng Kuo**, "Formation of Ordered FePt(001) Texture With Reduced Diffusion Length,"2009 IEEE International Magnetics Conference (INTERMAG 2009) , Sacramento, California, p.DP-03. (2009/5/4-8)
52. S. C. Chen, S. P. Chen, **P. C. Kuo**, "Effect of annealing on magnetic properties and domain structures of FePt thin films by rapid thermal annealing technique", the 2<sup>nd</sup> International Conference on Multi-functional Materials and Structures (MFMS), Ocean University of China, Qingdao, PRC., p. MF-1209. (2009/10/9-12)
53. S. C. Chen, T. Y. Kuo, Y. C. Lin, **P. C. Kuo**, "Fabrication of (200)-textured NiO films on glass substrate using radio frequency sputtering", the 2nd International

- Conference on Multi-functional Materials and Structures (MFMS), Ocean University of China, Qingdao, PRC., p. MF-906. (Oct. 9-12,2009)
- 54. Ger-Pin Lin, **Po-Cheng Kuo**, Chun-Ting Kuo, Sheng-Chi Chen, and Chi-Long Shen, "Effect of Ag addition on the CoPt-SiN<sub>x</sub>/Ag granular thin films", The 10th international symposium on sputtering and plasma processes, Kanazawa, Japan, TF P1-15. (2009)
  - 55. Ger-Pin Lin, **Po-Cheng Kuo**, Chi-Long Shen, Tsung-Lin Tsai, and Sin-Liang Ou, "Magnetic properties and microstructures of nano-size FePt islands films for ultra-high density magnetic recording media", The 10th international symposium on sputtering and plasma processes, Kanazawa, Japan, MN P3-2. (2009)
  - 56. Sin-Liang Ou, **Po-Cheng Kuo**, Chih-Hsiang Hsiao, Ger-Pin Lin, Don-Yau Chiang, Chao-Te Lee, Wei-Tai Tang, and Sheng-Chi Chen, "Microstructure and optical properties of Si/Cu<sub>100-x</sub>Zr<sub>x</sub> bilayer films for blue laser write-once optical recording media", The 10th international symposium on sputtering and plasma processes, Kanazawa, Japan, TF P1-10. (2009)
  - 57. G. P. Lin, **P. C. Kuo**, C. L. Shen, T. L. Tsai, S. C. Chen, "Magnetic properties and microstructures of FePt island films for ultra-high density magnetic recording media", Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B054. (2009)
  - 58. G. P. Lin , **P. C. Kuo**, C. T. Kuo, K. T. Huang, S. L. Ou, "Microstructure and magnetic properties of CoPt-SiN<sub>x</sub>/Ag granular films", Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B055. (2009)
  - 59. G. P. Lin, **P. C. Kuo**, C. L. Shen, T. L. Tsai, "Microstructure and magnetic properties of L10 FePt films with (001) texture on amorphous glass substrate", Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B203. (2009)
  - 60. S. C. Chen, T. H. Sun, C. L. Chang, and **P. C. Kuo**, "Growth Temperature Dependence of Magnetic Properties and Microstructures in Single-layered FePt Films", Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B159-P. (2009)
  - 61. Sin-Liang Ou, **Po-Cheng Kuo**, Shih-Hsien Ma, Chih-Long Shen, Sheng-Chi Chen, Don-Yau Chiang, Chao-Te Lee, and Wei-Tai Tang, "Microstructure and Recording Characteristics of (GeSbSn)<sub>100-x</sub>Fe<sub>x</sub>Phase Change Optical Recording Films", Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, C196-P. (2009)
  - 62. C. L. Shen, **P. C. Kuo**, Y. S. Li, G. P. Lin, S. L. Ou, and S. C. Chen, "Thickness Dependence of Microstructures and Magnetic Properties for CoPt/Ag Thin

- Films“, Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B289-P. (2009)
- 63. Kai-Tze Huang, **Po-Cheng Kuo**, and Yeong-Der Yao, "Induced perpendicular magnetic anisotropy in oblique-deposited Fe arrays“, Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B166-P. (2009)
  - 64. Kai-Tze Huang, **Po-Cheng Kuo**, Sheng-Chi Chen, and Yeong-Der Yao, "Curvature induced magnetic properties in FePt nano-domes“, Taiwan Association for Coatings and Thin Films Technology, Taipei, Taiwan, B244-P. (2009)
  - 65. S. C. Chen, T. H. Sun, and **P. C. Kuo**, "Influence of annealing on coercivity and microstructures of FePt films by rapid thermal annealing technique“, Seventh Asian-European International Conference on Plasma Surface Engineering (AEPSE 2009), Busan, Korea, P2009-158. (2009)
  - 66. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, and S. L. Hsu, "Granular Co-rich Co-Pt Grains with Low Ordering Temperature and High Perpendicular Hard Magnetic Properties for High-Density Magnetic Recording Media“, 2008 IEEE International Magnetics Conference (INTERMAG 2008), Madrid-Spain, p.CT-01. (2008/5/4-8)
  - 67. A. C. Sun, Y. C. Tsai, F.T. Yuan, J. H. Hsu, and **P. C. Kuo**, "Effect of MgO addition on structural and magnetic properties of (001) textured FePt thin films“, 2008 IEEE International Magnetics Conference (INTERMAG 2008), Madrid-Spain, p.CT-03. (2008/5/4-8)
  - 68. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, K. T. Huang, G. P. Lin, "Improvement in (200)-texture and reduction in grain size of MgO films by introduction of N<sub>2</sub> gas during sputtered MgO films "The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4230. (2008/7/14-16)
  - 69. S. C. Chen, S. P. Chen, **P. C. Kuo**, "L10-FePt thin films with high coercivity and fine grain by rapid thermal annealing“, The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4309. (2008/7/14-16)
  - 70. S. C. Chen, **P. C. Kuo**, C. L. Shen, Y. H. Fang, K. T. Huang, G. P. Lin, S. L. Hsu, "High perpendicular hard magnetic properties of nanocomposite Co<sub>3</sub>Pt/Pt double-layered films by epitaxial deposition without capped layer“, The 4th International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4675. (2008/7/14-16)
  - 71. Kai-Tze Huang, **Po-Cheng Kuo**, Yeong-Der Yao, "Magnetic Properties and Formation of Anodic Aluminum Oxides Induced Fe Nano-sized Arrays“, The

- 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4214. (2008/7/14-16)
72. Yen-Hsiang Fang, **Po-Cheng Kuo**, An-Cheng Sun, S. C. Chen, "Microstructure and Magnetic Properties of FePt-Si<sub>3</sub>N<sub>4</sub> Thin Films", The 4th International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4410. (2008/7/14-16)
73. Yen-Hsiang Fang, **Po-Cheng Kuo**, S. C. Chen, Ger-Pin Lin, 2008, "Alternate monatomic layer deposited L10 FePt (001) with high coercivity and small grain size " The 4th International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4412. (2008/7/14-16)
74. Ger-Pin Lin, **Po-Cheng Kuo**, Yen-Hsiang Fang, C. T. Kuo, "Magnetic properties of CoPt-Si<sub>3</sub>N<sub>4</sub>nанocomposite films", The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4409. (2008/7/14-16)
75. G. P. Lin, **P. C. Kuo**, Y. H. Fang, S. L. Ou, and S. C. Chen, "Exchange effect in TM-TbCo/RE-TbCo Double Layer films", International Conference on Multifunctional Materials and Structures, Hong Kong, p.MF303-1 (2008/7/28-31)
76. G. P. Lin, **P. C. Kuo**, P. L. Lin, Y. H. Fang and K. T. Huang, "Magnetic properties of TbCo/(SiN<sub>x</sub>/Co)<sub>n</sub>films", International Conference on Multifunctional Materials and Structures, Hong Kong, p. MF303-3. (2008/7/28-31)
77. G. P. Lin, **P. C. Kuo**, H. C. Liu, Y. H. Fang, and K. T. Huang, "Effect of Sm content on the magnetic properties of the sputtered SmCo thin film", International Conference on Multifunctional Materials and Structures, Hong Kong, p. MF303-4. (2008/7/28-31)
78. Sin-Liang Ou, **Po-Cheng Kuo**, Shu-Chi Sheu, Chih-Hsiang Hsiao, Don-Yau Chiang, and Wei-Tai Tang, "Effects of Bi doping on the In<sub>15</sub>Sb<sub>85</sub> phase change recording thin film", International Conference on Multifunctional Materials and Structures, Hong Kong, p.MF316. (2008/7/28-31)
79. G. P. Lin, **P. C. Kuo**, C. T. Kuo, Y. H. Fang, S. C. Chen and K. T. Huang, "Nanocomposite CoPt-SiN<sub>x</sub>/Ag films for high density magnetic recording media", Asian Magnetic Conference (AMC), Busan, Korea, p.BP-05. (2008/12/10-13)
80. S. C. Chen , T. Y. Kuo, T. H. Sun, and **P. C. Kuo**, "Granular FePt-NiO films by rapid thermal annealing technique for high density magnetic recording media", The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008)" Singapore, p.4309. (2008/7/14-16)

81. A. W. Chen, **P. C. Kuo**, G. P. Lin, and Y. H. Fang, "Effect of CoPt magnetic layer thickness on magnetic properties of CoPt/Ag patterned media", Asian Magnetic Conference (AMC) , Busan, Korea, p.BP-02. (Dec. 10-13, 2008)
82. Y. H. Fang, **P. C. Kuo**, An-Cheng Sun, S. C. Chen, Kai-Tze Huang, and G. P. Lin, "Effects of SiN<sub>x</sub>content on the microstructure and magnetic properties of FePt-SiN<sub>x</sub> granular thin films", Asian Magnetic Conference (AMC) 2008, Busan, Korea, p.ER 12. (2008/12/10-13)
83. S. L. Ou, **P. C. Kuo**, P. L. Lin, Y. H. Fang, G. P. Lin and S. C. Chen, "Effect of SiN<sub>x</sub> capped layer on the microstructure and magnetic properties of CoPt/Ag thin films", Asian Magnetic Conference (AMC), Busan, Korea, p.BP2-72. (2008/12/10-13)
84. S. C. Chen, **P. C. Kuo**, T. Y. Kuo, Y. H. Fang, G. P. Lin, S. L. Ou, and K. T. Huang, "Microstructure and coercivity of nanocomposite FePt films with different capped layer", Asian Magnetic Conference (AMC), Busan, Korea, p.DS-02. (2008/12/10-13)
85. S. C. Chen, **P. C. Kuo**, Y. H. Fang, S. L. Ou, G. P. Lin, K. T. Huang, S. L. Hsu, and T. Y. Kuo, "Enhancement in perpendicular hard magnetic properties of Co-rich Co-Pt films by epitaxial deposition without capped layer", Asian Magnetic Conference (AMC), Busan, Korea, p.BP-03. (2008/12/10-13)
86. G. P. Lin, **P. C. Kuo**, C. T. Kuo, S. C. Chen, K. T. Huang and C. L. Shen, "CoPt-SiN<sub>x</sub>/Ag granular thin films for high density magnetic recording media", 2008 International Electron Devices and Materials Symposia (IEDMS), Taichung, Taiwan, p.476. (2008/11/28-29)
87. S. C. Chen, T. Y. Kuo and **P. C. Kuo**, "Effect of O<sub>2</sub> partial pressure on the properties and microstructure of P-type semi-transparent conductive NiO films", 2008 International Electron Devices and Materials Symposia (IEDMS), Taichung, Taiwan, p.482. (2008/11/28-29)
88. A. W. Chen, **P. C. Kuo**, G. P. Lin, and Y. H. Fang, "Magnetic properties and microstructure of Tb<sub>30</sub>Co<sub>70</sub>/Ag patterned media", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.P-127. (2008/12/15-17)
89. G. P. Lin, **P. C. Kuo**, C. T. Kuo, S. C. Chen, Y. H. Fang and K. T. Huang, "Effects of Ag addition on CoPt-SiN<sub>x</sub>/Ag granular thin films", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.P-49. (2008/12/15-17)
90. S. L.Ou, **P. C. Kuo**, C. H. Hsiao, D. Y. Chiang , W. T. Tang, H. C. Chen, C. L. Chen and K. L. Fang, "Si/Ta Bilayer Thin Film for Optical Write-once Media", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.P-24. (2008/12/15-17)

91. S. L.Ou, **P. C. Kuo**, C. W. Chen, D. Y. Chiang , W. T. Tang, H. C. Chen, C. L. Chen and S. C. Chen, "Microstructure and Recording Mechanism of Si/Mo Bilayer for Write-once Optical Disc", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.P-25. (2008/12/15-17)
92. S. C. Chen, **P. C. Kuo**, Y. H. Fang, S. L. Ou, G. P. Lin, K. T. Huang, S. L. Hsu, T. H. Sun, "Microstructures and perpendicular hard magnetic properties of granular Co<sub>3</sub>Pt/Pt and CoTb/Co<sub>3</sub>Pt/Pt films", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.P-48. (2008/12/15-17)
93. Ger-Pin Lin, **Po-Cheng Kuo**, C. T. Kuo, Y. H. Fang, S. C. Chen, and K. T. Huang, "Microstructure and magnetic properties of CoPt-Si<sub>3</sub>N<sub>4</sub>/Ag nanocomposite films", The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008), Singapore, p.4409. (Jul. 14-16, 2008)
94. S. C. Chen, S. T. Huang, T. Y. Kuo and **P. C. Kuo**, "Effect of heating rates of rapid thermal annealing on the microstructures and magnetic properties of FePt thin films", 53<sup>rd</sup> Annual Conference on Magnetic Materials, Austin, Texas, p.BQ-05. (2008/11/10-14)
95. Y. H. Fang, **P. C. Kuo**, P. L. Lin, and C. T. Kuo, "Magnetic Properties of FePt-Si<sub>3</sub>N<sub>4</sub> Nanocomposite Films", The 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2008)" Singapore, p.4421. (2008/7/14-16)
96. A. C. Sun, F. T. Yuan, J. H. Hsu, Y. H. Lin, and **P. C. Kuo**, "Magnetic reversal behavior of perpendicular exchange-coupled Fe/FePt bilayer films", Asian Magnetic Conference (AMC), Busan, Korea, p.DS-02. (2008/12/10-13)
97. Y. H. Fang, **P. C. Kuo**, and G. P. Lin, "High coercivity and small grain size of L10 FePt(001) thin films by alternated deposited", Asia-Pacific Data Storage Conference (APDSC'08), Jeju Island, Korea., p.220. (Dec 15-17, 2008)
98. An-Cheng Sun, Jen-Hwa Hsu, **P. C. Kuo**, and H. L. Huang, "Magnetic behaviors of (FePt-MgO)/Pt(001)/Cr(002) trilayers as the percolated perpendicular recording medium", 10th Joint MMM/Intermag conference, Baltimore, Maryland, USA., p.FX-06.(2007)
99. A. Y. Chou, Y. D. Yao, **P. C. Kuo**, K. Cheng and C. Yu, "Magnetic properties and magnetoresistance of MgO thin film with CoFeB and CoFeC underlayer", 10<sup>th</sup> Joint MMM/Intermag conference, Baltimore, Maryland, USA., p.CR-09. (2007)
100. S. C. Chen, and **P. C. Kuo**, "Effect of capped layer on the microstructure and magnetic properties of FePt films", 10<sup>th</sup> Joint MMM/Intermag conference, Baltimore, Maryland, USA., p.AF-03. (2007)

101. Jen-Hwa Hsu, An-Cheng Sun, Y. C. Tsai, **P. C. Kuo**, and H. L. Huang, "Percolated perpendicular medium of FePt-MgO/Pt/Cr trilayer film for ultra-high magnetic recording beyond 1 Tbits/in<sup>2</sup>", The 1<sup>st</sup>ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea., p.CB06 (2007/5/28-6/1)
102. Y. H. Fang, **P. C. Kuo**, S. C. Chen , C. T. Kuo, T. Y. Huang, " High Magnetization Exchange Coupled TM-TbCo/RE-TbCo Double Layer ", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea, p.TC05. (2007/5/28-6/1)
103. Pai-Li Lin, **Po-Cheng Kuo**, Sheng-Chi Chen, and Yen-Hsiang Fang, "Magnetic properties and microstructure of TbCo/(Co/SiN<sub>x</sub>)<sub>n</sub> films", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications) Conference; Jeju island, Korea, p.UA06. (2007/5/28-6/1)
104. Ger-Pin Lin, **Po-Cheng Kuo**, and Hou-Chien Liu, "Effect of Sm content on the magnetic properties of the SmCo thin film", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea, p.TC06. (2007/5/28-6/1)
105. Sin-Liang Ou, **Po-Cheng Kuo**, and Shu-Chi Sheu, "Optical properties of nanostructure (In<sub>15</sub>Sb<sub>85</sub>)<sub>100-x</sub>Zn<sub>x</sub>thin films", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea, p.UA14(2007/5/28-6/1)
106. S. C. Chen, **P. C. Kuo**, P. L. Lin, Y Li, and Y. H. Fang, "Effect of Co underlayer on the magnetic properties and microstructures of TbCo films", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea, p.TC03. (2007/5/28-6/1)
107. S. C. Chen, **P. C. Kuo**, P. L. Lin, Y. H. Fang, A. C. Sun, and T. H. Wu, "Enhanced perpendicular coercivity and magnetic anisotropy of FePt films by using Ag capped layer", The 1st ISAMMA (International Symposium on Advanced Magnetic Materials and Applications)Conference; Jeju island, Korea, p.TA02. (2007/5/28-6/1)
108. Y. H. Fang, **P. C. Kuo**, C. T. Kuo, T. Y. Huang, "Interfacial energy in Tb<sub>29.3</sub>Co<sub>70.7</sub>/Tb<sub>17.2</sub>Co<sub>82.8</sub> bilayer films", The 1<sup>st</sup> ISAMMA (International Symposium on Advanced Magnetic Materials and Applications) Conference; Jeju island, Korea, p.TC04. (2007/5/28-6/1)
109. T. H. Wu, **P.C. Kuo**, Jung-Po Chen, Chih-Yuan Wu, Po-Fu Yen, Tzuan-Ren Jeng, Der-Ray Huang, and Sin-Liang Ou, "Ge/Al Bilayer Thin Film for Optical Write-once Media", Optical Data Storage(ODS) Conference, Portland, Oregon, USA. p.MD8. (2007/5/20-23)

110. Yen-Hsiang Fang, **Po-Cheng Kuo**, Ting-Hau Wu, Ger-Pin Lin, Hou-Chien Liu, "Magnetic properties of TbCo/SmCo bi-layer films", The International Conference on Nanoscale Magnetism (ICNM-2007), Istanbul, Turkey. P.167. (2007/6/25-29)
111. T. H. Wu, **P.C. Kuo**, Jung-Po Chen, Chih-Yuan Wu, Tzuan-Ren Jeng, Der-Ray Huang, and Yen-Hsiang, Fang, "Ge/Au nano-bilayer films for optical write-once media", The International Conference on Nanoscale Magnetism (ICNM-2007), Istanbul, Turkey. P.387. (2007/6/25-29)
112. Sin-Liang Ou, **Po-Cheng Kuo**, Chih-Hsiang Hsiao, Don-Yau Chiang, Wei-Tai Tang, Shih-Hsien Ma, and Ting-Hau, "Si/ Mo Bilayer Thin Film for Optical Write-once Media", International Symposium on Optical Memory 2007 (ISOM 2007), Singapore. P.91. (Oct. 21-25, 2007)
113. G. P. Lin, **P. C. Kuo**, H. C. Liu, Y. H. Fang, and S. L. Ou, "Effect of Sm content on the magnetic properties of sputtered SmCo thin film", Third Seeheim Conference on Magnetism Frankfurt, Germany, p.P-41. (2007/8/26-30)
114. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu, and Y. H. Fang , " Microstrucyure and magnetic properties of Co-rich Co-Pt films by epitaxial deposition on Pt underlayer", Third Seeheim Conference on Magnetism Frankfurt, Germany, p.P-14. (2007/8/26-30)
115. S. C. Chen, G. P. Lin, **P. C. Kuo**, Y. H. Fang , and P. L. Lin, " Microstrucyure and magnetic properties of TbCo/Co bilayer films", Third Seeheim Conference on Magnetism Frankfurt, Germany, p.P-40. (2007/8/26-30)
116. Y. H. Fang , **P. C. Kuo**, "Exchange interaction effect of TbCo/Co bilayers", Third Seeheim Conference on Magnetism Frankfurt, Germany, p.P-20. (2007/8/26-30)
117. K. T. Huang, Y. D. Yao, S. C. Chen, **P. C. Kuo**, and S. P. Chen, "Magnetic properties and microstructure of curvature induced FePt thin films", Third Seeheim Conference on Magnetism Frankfurt, Germany, p.P-32. (2007/8/26-30)
118. S. L. Ou, **P. C. Kuo**, P. L. Lin, Y. H. Fang, and G. P. Lin, "Microstructures and magnetic properties of CoPt/Ag and SiN<sub>x</sub>/CoPt/Ag thin films", Third Seeheim Conference on Magnetism, Frankfurt, Germany, p.P-49. (2007/8/26-30)
119. Y. H. Fang, **P. C. Kuo**, P. L. Lin, G. P. Lin, and S. L. Ou, "Magnetic Properties of CoPt-Si<sub>3</sub>N<sub>4</sub>/Ag Nanocomposite Films", 8<sup>th</sup> Perpendicular Magnetic Recording Conference (PMRC2007), Tokyo, Japan. p.15pD-21 °. (2007/10/15-17)
120. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu, Y. H. Fang, K.T. Huang, and G. P. Lin, "Enhanced (200)-textured MgO films by rf-magnetron sputtering in Ar plus N<sub>2</sub> atmosphere", International Conference on Surface, Coatings and Nanostructured Materials, Algarve, Portugal., p.NNC126. (2007/6/9-11)

121. Y. C. Tasi, An-Cheng Sun, Je-Hwa Hsu, and **P. C. Kuo**, "Percolated perpendicular FePt magnetic recording thin films", The 19<sup>th</sup> Conference on Magnetism and Magnetic Technologies, Douliou, Taiwan, p.A-48. (2007)
122. Y. H. Fang, **P. C. Kuo**, P. L. Lin, C. T. Kuo, and G. P. Lin, "Microstructure and Magnetic Properties of CoPt-Si<sub>3</sub>N<sub>4</sub>/Ag Thin Films", 52<sup>nd</sup> Annual Conference on Magnetism and Magnetic Materials, Tampa, Florida, p.FQ-06. (2007/11/5-9)
123. G. P. Lin, S. C. Chen, **P. C. Kuo**, Y. H. Fang, P. L. Lin, "Effect of Co layer thickness on the magnetic properties of Tb<sub>30</sub>Co<sub>70</sub>/SiN<sub>x</sub>/Co thin films", 8<sup>th</sup> Perpendicular Magnetic Recording Conference (PMRC2007), Tokyo, Japan. p.16pC-11. (2007/10/15-17)
124. S. C. Chen, **P. C. Kuo**, C. L. Shen, S. L. Hsu and Y. H. Fang, "Sputtered epitaxial Co-rich Co-Pt films for perpendicular magnetic recording media", 8<sup>th</sup> Perpendicular Magnetic Recording Conference (PMRC2007), Tokyo, Japan. p.15pD-22. (2007/10/15-17)
125. An-Cheng Sun, Jen-Hwa Hsu, **P. C. Kuo**, H.L. Huang, H.M. Tsai, and W.F. Pong, "Ordering Kinetics of Perpendicular Magnetic Anisotropy L10 FePt Thin Films Studied by X-ray Absorption Spectroscopy", 8<sup>th</sup> Perpendicular Magnetic Recording Conference (PMRC2007), Tokyo, Japan. p.16pB-04. (2007/10/15-17)
126. An-Cheng Sun, Jen-Hwa Hsu, **P. C. Kuo**, and H.L. Huang, "Magnetization Switching Behavior of Perpendicular Exchange Coupled Fe/FePt Bilayer Films", 2007 Taiwan-Korea Data Storage Symposium, Hsinchu,Taiwan. P.24. (2007)
127. Y.C. Tsai, An-Cheng Sun, Jen-Hwa Hsu, and **P. C. Kuo**, "Evaluation of Percolated Perpendicular Medium Performance Using FePt-MgO Films", 8<sup>th</sup> Perpendicular Magnetic Recording Conference (PMRC2007), Tokyo, Japan. p.17aA-07. (2007/10/15-17)

### **Domestic Conference Papers**

1. C. L. Shen, **P. C. Kuo**, G. Lin, K. Huang, and S. Chen, "Microstructures and magnetic properties of FePt nanocomposite thin films deposited on amorphous glass substrate directly" 2011 IEEE International Magnetics Conference (INTERMAG 2011), Taipei, Taiwan, p.FS-05. (2011/4/25-29)
2. C. L. Shen, **P. C. Kuo**, K. Huang, and S. Chen, "Microstructures and Magnetic Properties of CoPt-SiNx-Ag Granular Thin Films with Ag Underlayer" 2011 IEEE International Magnetics Conference (INTERMAG 2011), Taipei, Taiwan, p.FS-06. (2011/4/25-29)
3. 陳尚澤、郭博成、方彥翔、沈智隆、柯建安、王健名、鄭敏慧，“厚度對 TM-TbCo/RE-TbCo 雙層熱寫磁讀薄膜之磁性質與熱磁性質的影響”，中國材料科學學會 99 年年會論文集，p.05-0935。(2010/11/19-20)

4. 王健名、郭博成、方彥翔、沈智隆、陳勝吉，“添加  $\text{SiN}_x$  對 FePt 合金薄膜之磁性質與微結構之影響”，中國材料科學學會 99 年年會論文集，p. 05-0938。(2010/11/19-20)
5. 陳勝吉、孫達皇、陳琮達、張哲良、蘇偉翔、郭博成，“Microstructures and Magnetic Properties of Single-layered FePt Films by in-situ Annealing”，中國材料科學學會 99 年年會論文集，p. 05-0256。(2010/11/19-20)
6. 陳勝吉、郭宗諺、郭博成，”Microstructure and properties of non-stoichiometric nickel oxide films”，中華民國物理年會(MATACT2008)，p.PB-22。(2009/1)
7. 王顯文、孫安正、林奕宏、許仁華、郭博成，”Investigating the influence of sputtering parameters on the formation of CoPt(100) thin films”，2009 磁性年會及兩岸磁性會議，高雄，p. JO2。(2009)
8. 陳勝吉、孫達皇、張哲良、郭博成，”Thickness Dependence of Texture and Magnetic Properties in Single-layered FePt Films by Rapid Thermal Annealing”，2009 年中國材料科學學會年會論文集，05-0287。(2009)
9. 巫孟軒、郭博成、黎穎姍、林哲平、沈智隆、歐信良，”添加 Ag 底層之顆粒狀 CoPt 垂直磁紀錄薄膜的研究”，2009 年中國材料科學學會年會論文集，05-0912。(2009)
10. 沈智隆、郭博成、黎穎姍、林哲平、黃凱澤、陳勝吉，”CoPt 薄膜之微結構與磁性質研究”，2009 年中國材料科學學會年會論文集，05-0788。(2009)
11. 沈智隆、郭博成、黎穎姍、林哲平、歐信良、陳勝吉，”厚度對 CoPt 薄膜之微結構與磁性質之影響”，2009 年中國材料科學學會年會論文集，05-0789。(2009)
12. M. H. Hsieh, K. T. Huang, J. K. Wu, P. C. Kuo, D. H. Wei, and Y. D. Yao, “The formation of Co nano-sized arrays using nanoporous anodic aluminum oxides”，The 5th Taiwan International Conference on Spintronics，C-3-1。(2009)
13. 黃子芸、郭博成、黎穎姍、林哲平、沈智隆，”Ag 底層對不同厚度 CoPt 薄膜的微結構與磁性質之影響”，2009 年中國材料科學學會年會論文集，05-0826。(2009)
14. 陳勝吉、孫達皇、陳松柏、郭博成，”The effect of film thickness on the texture and microstructure of FePt thin films”，中華民國物理年會(MATACT2008)，p.PC-04。(2009/1)
15. 林哲平、郭博成、郭俊廷、黃凱澤、陳勝吉，”CoPt- $\text{SiN}_x$ /Ag 顆粒狀垂直紀錄薄膜的研究”，中國材料科學學會 97 年年會論文集，p.P05-035。(2008/11)
16. 林哲平、郭博成、方彥翔、陳勝吉，”Exchange effect in TM-TbCo/RE-TbCo bilayer films”，第二十屆磁學及磁性技術研討會論文集，p.64。(2008)
17. 陳勝吉、孫達皇、郭博成，”奈米顆粒狀 FePt-NiO 複合薄膜之顯微結構與磁性質研究”，中國材料科學學會 97 年年會論文集，p.P05-008。(2008/11)

18. 陳勝吉、郭宗諺、林煜晉、陳松柏、**郭博成**，”快速熱退火溫度對 FePt 合金薄膜顯微結構與磁性質之影響”，中國材料科學學會 97 年年會論文集，p.P05-009。(2008/11)
19. 陳勝吉、郭宗諺、**郭博成**，”氧分壓對 P 型半透明 NiO 半導體薄膜之電與光性質影響”，台灣鍍膜科技協會年會(MATACT2008)，p.B17 02-021。(2008/12)
20. 陳勝吉、孫達皇、陳松柏、**郭博成**，”薄膜厚度對 FePt 合金之磁異向性與顯微結構之影響”，台灣鍍膜科技協會年會(MATACT2008)，p.E04 05-008。(2008/12)
21. 陳勝吉、**郭博成**、林百勵、方彥翔、孫安正，“Effects of MgO and Ag capped layer on the coercivity and magnetic anisotropy of FePt films”，中華民國物理學會 96 年年會論文集，PC-18。(2007)
22. **郭博成**、方彥翔，”TbCo/FePt(001)及 TM-TbCo/RE-TbCo 雙層熱寫磁讀記錄薄膜”，第十九屆磁學及磁性技術研討會論文集，p. A-51。(2007)

### Reports

1. **郭博成**，2008，“低序化溫度的奈米晶 FePt 垂直記錄媒體之研製”，國科會研究計畫報告，NSC 95-2221-E-002-119-MY3。
2. **郭博成**，2007，”無機可寫一次光碟片之研究(I)”，中環公司研究計畫報告，95-S-A82。

### Patents

1. **Po-Cheng Kuo**, Yen-Hsiang Fang, An-Cheng Sun, Tao-Hsuan Yang, Chun-Yuan Chou, and Ching-Ray Chang, 「Heat assited magnetic recording medium and method for fabricating the same」，美國發明專利第 7,838,135 號。
2. **郭博成**，方彥翔、孫安正、楊道軒，周群淵、張慶瑞，「熱寫磁讀記錄媒體及其製造方法」，中華民國發明專利，專利期間：自 2010 年 10 月 21 日至 2026 年 3 月 12 日。
3. 孫安正，**郭博成**，黃輝理，許仁華，張慶瑞，「可調整式磁記錄媒體及其製作方法」，中華民國發明專利第 I 312151 號。專利期間：自 2009 年 7 月 11 日至 2025 年 6 月 13 日。
4. Yeong-Der Yao, **Po-Cheng Kuo**, Sheng-Chi Chen, An-Cheng Sun, Chen-Chieh Chiang, 2008, Fabrication of nanocomposite thin films for high density magnetic recording media」，日本發明專利，專利號碼：特許第 4084638 號。專利期間：(2008/2/22-2022/11/15)
5. **郭博成**，黃輝理，許仁華，張慶瑞，孫安正，陳勝吉，周群淵，李長泰，張晃暉，「製備一 L10 合金薄膜的方法」，中華民國發明專利第 I274788 號。專利期間：(2007/3/1-2024/12/9)
6. Wei-Chih Hsu, Song-Yeu Tsai, Mei-Rurng Tseng, Shih-Peng Hsu, Tien-Tsan Hung, **Po-Cheng Kuo**, 「Super-Resolution Recordable optical disc」，美國發明專利第 6,920,640 號。專利期間：(2005/9/5-2020/9/13)