

誌謝

首先我要向我的指導教授楊宗哲老師致上最高的敬意。感謝他在研究與生活上能成我學習的榜樣，更感謝對我的指導與鼓勵。在這六年的學習生涯中，讓我學習到研究的態度及方法，也讓我充實自我的學問。此外，我也要感謝洪連輝老師和吳仲卿老師無論是在實驗上、課堂上、研究上或平日會議時給予我非常多地指導與幫助，令我獲益良多。

另外我要感謝在學習上和我奮鬥的同學們青雲技術學院的遠鳳、律堯、國勝與我交友匪淺的同學兼室友晃銘。感謝這一路上每位陪我研究和學習的學弟妹景朝、瑞福、子偉、義宏、雅雯、育琦、家凱、稟宏、光鏡、昭憲、和國銘。特別要感謝我所帶過的幾位學弟妹柏亨、珮甄、瑞君、家偉和佳慶，謝謝你們陪我度過漫長的實驗時間，此論文是我們一齊努力出來的成果。若沒有你們的大力幫忙，我無法順利地完成此論文，在此獻上我最深的敬意。

僅此論文

獻給所有關心我的朋友。

Publication List

A. papers:

1. S. L. Young, Y. C. Chen, Lance Horng, T. C. Wu, H. Z. Chen, J. B. Shi, "Structural and magnetic properties in $\text{La}_{0.7}\text{Pb}_{0.3}\text{Mn}_{1-x}\text{Co}_x\text{O}_3$ systems," J. Magn. Magn. Mater. 209, 148 (2000).
2. G. Chern, L Horng, W.K. Shieh, T.C. Wu, "Antiparallel state, compensation point, and magnetic phase diagram of $\text{Fe}_3\text{O}_4 / \text{Mn}_3\text{O}_4$ superlattices," Phys. Rev. B. 6309, 4421 (2001).
3. S. L. Young, Y. C. Chen, Lance Horng, T. C. Wu and J. C. Chang, "Synthesis Characterization and Magnetic Properties of The $\text{Ln}_{0.7}\text{Pb}_{0.3}\text{MnO}_3$ (Ln=La, Nd, and Pr) Manganites," J. Magn. Magn. Mater. 239, 11 (2002).
4. Lance Horng , C. C. Chang, T. C. Wu, S. L. Young, Y. C. Chen, and H. Z. Chen, "Synthesis and magnetic characterization of the $\text{La}_{0.6}\text{Ln}_{0.1}\text{Pb}_{0.3}\text{MnO}_3$ (Ln = Pr, Nd and Y) manganites," J. Appl. Phys 91, 8906(2002).
5. Lance Horng, J. C. Wu, T. C. Wu, and S. F. Lee, "Flux pinning force in Nb thin films with periodic vortex pinning arrays," J. Appl. Phys 91, 8510 (2002).
6. Lance Horng, J. C. Wu, P. C. Kang, P. H. Lin, and T. C. Wu, "Pinning effects induced by periodic arrays of structural corrugations in Nb thin films," Jpn. J. Appl. Phys. 42, 2679 (2003).
7. Lance Horng, J. C. Wu, P.C. Kang, T. C. Wu, and T. J. Yang, "Matching effect and flux pinning force in a Nb superconducting thin film with triangular lattice of artificial pinning centers", J. Magn. Magn. Mater. 272, p1107 (2004).
8. T. C. Wu, P. C. Kang, Lance Horng, J. C. Wu, and T. J. Yang, "Anisotropic pinning effect on a Nb thin films with triangular arrays of pinning centers", J. Appl. Phys. 95, 6696 (2004).
9. T. C. Wu, J. C. Wang, Lance Horng, J. C. Wu, and T. J. Yang, "Temperature dependence of vortex configuration by honeycomb hole arrays in a superconducting Nb film", J. Appl. Phys. 97, 10B102 (2005).
10. T. C. Wu, P. C. Kang, J. C. Wu, Lance Horng, and T. J. Yang, "Vortex Dynamics in

Nb Thin Films with Triangular Potential,” Chinese Journal of Physics 43, 709 (2005).

11. T. C. Wu, Lance Horng, C. W. Hsiao, J. C. Wu, and T. J. Yang, “The ac effect of vortex pinning in the arrays of defect sites on Nb films,” J. Appl. Phys. 99, 08M515 (2006).

12. T. C. Wu, Lance Horng, C. W. Hsiao, J. C. Wu, and T. J. Yang, “Vortex dynamics in spacing-graded array of defects on a niobium film,” Physica C, 437-438, 353-356 (2006).

13. Lance Horng, T. C. Wu, J. C. Wu, R. Cao, and T. J. Yang, “Properties of vortex propagation in a niobium film with spacing-graded density of pinning sites,” J. Appl. Phys. 101, 09G113 (2007).

14. R. Cao, T.C. Wu, P.C. Kang, J.C. Wu, T.J. Yang, and Lance Horng, “Anisotropic pinning in Nb thin films with triangular pinning arrays,” to be published in Solid State Communications (2007).

15. T. C. Wu, Lance Horng, J. C. Wu, R. Cao, Jan Koláček, and T. J. Yang, “Vortex ratchet effect in a niobium film with spacing-graded density of pinning sites,” to be published in J. Appl. Phys. (2007).

B. Award:

1. T. C. Wu, J. C. Wu, and Lance Horng, “Flux pinning effect in Nb thin films by regular square arrays”, **Excellent post paper award of the Physical Society of Republic of China in 2001 (90年物理學會壁報論文獎)**.

2. T. C. Wu,” Flux Pinning Effect in Nb Superconducting Thin Films with Flux Pinning Arrays”, **Excellent thesis award of National Science Council of the Republic of China in 2002 (91年度國科會碩士論文獎)**.

3. T. C. Wu,” Flux Pinning Effect in Nb Superconducting Thin Films with Flux Pinning Arrays”, **Excellent thesis award of Physical Society of the Republic of China in 2002 (91年中華民國物理碩士論文優等獎)**.

4. T. C. Wu,” Flux Pinning Effect in Nb Superconducting Thin Films with Flux Pinning Arrays”, **Excellent thesis award of National Cultural Association (中華文化復興運動總會)**.

5. P. H. Lin, J. C. Wu, T. C. Wu, and Lance Horng, ” Flux Creep in Nb Thin Films by Regular Square Arrays” , **Excellent post paper award of the Physical Society of Republic of China in 2002 (91年物理學會壁報論文獎)**.

6. J. C. Wang, T. C. Wu, T. J. Yang, J. C. Wu, and Lance Horng, ” Mechanism of Vortex Pinning by Hexagonal Arrays of Submicrometric Defects in a Superconducting Nb Films. ”, **Excellent post paper award of the Physical Society of Republic of China**

in 2004 (93年物理學會壁報論文獎).

7. C. W. Hsiao, T. C. Wu, T. J. Yang, J. C. Wu, and Lance Horng,” Mechanism of Vortex Pinning By Graded Triangular Arrays of Submicrometric Defects in a Superconducting Nb Film”, **Excellent post paper award of the Physical Society of Republic of China in 2005 (94年物理學會壁報論文獎)**.
8. R. M. Hsu, T. C. Wu, C. W. Hsiao, J. C. Wu, and Lance Horng,” Size dependence of the pinning effect on Nb Film”, **Excellent post paper award of the Physical Society of Republic of China in 2006 (95年物理學會壁報論文獎)**.

