應用於近場紀錄之表面電漿波增強式C型奈米波導

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摘要

高密度儲存系統之瓶頸，在於難以取得奈米光點與光輸出量之兼顧。本論文提出一種創新次波長微孔設計，引進奈米波導與表面電漿子的雙重耦合效應，大幅增加穿透場的能量同時仍保持光點大小在奈米之等級。此外，此微孔設計將被應用於光纖之上。由於光纖的輕巧及可撓性，將有利於和既有之磁讀取頭整合成為一個複合式的近場光纖讀取頭。

根據數值分析與最佳化的結果，若與傳統的次波長微孔做比較，光輸出量將可提升10^5。實驗的結果，此一微孔設計在近場區域可獲得一個訊噪比為 40 dB 的光學信號，而傳統微孔則因輸出量太低而無法測得；另外，遠場的穿透率也可提升 33 倍。這兩項的實驗結果都可證實在此一微孔設計的近場區域有極強的能量提升，達到一個高密度儲存系統的需求。

Surface Plasmon Enhanced C-shaped Nano-waveguide for Near-field Recording

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Abstract

The difficulty that a high density storage system encounters lies in giving consideration on both a nano-sized optical spot and an adequate throughput. This thesis proposed an innovative aperture design which possesses the annex of a nano-waveguide and surface plasmon polaritons to substantially increase the throughput at a nano-sized optical spot concomitantly. Besides, this aperture design was fabricated on the end face of a fiber, of which the compactness and flexibility facilitate to be integrated with a magnetic pickup as a near-field hybrid one.

By the analyses and optimization, an enhancement with five orders of magnitude in power throughput was derived; moreover, the implemented experimental results, a near-field transmitted intensity with a signal-noise ratio of 40 dB and a far-field transmission enhancement of 33, evidently demonstrated the strong transmitted field enhancement in the near-field region and fulfilled the requirement of a high-density storage system.

Acknowledgement

In my two-year graduate life, I am especially grateful to Professor Han-Ping D. Shieh, who gave me many valuable advices and abundant resources. He never told me what the manner to my research should be, but his attitude towards works is just exemplariness to me. Besides, I also appreciate Professor Chung-Hao P. Tien, who gave me many useful feedbacks and suggestions to reap no little benefits.

Besides, my classmates, Moca Chen, Jun-Jay Wang, Chiao-Hen Huang, Hao-Wei Chiu, Zhe-Hung Lin, and Wan-Ling Tsai, have accompanied me during these days and brought me many joys. Those younger classmates, Yen-Hsing Lu, Che-Jen Lin, Wei-Liang Kao, Ming-Jing Chieh and Chieh-Hsiang Hung, and those senior classmates, Ko-Wei Dodu Chieh, Yi-Pei Bounds Huang, Po-Ru Paul Yang, Chiao-Shun Patric Chuang, An-Chi Angel Wei, Chi-Huan Lionel Lee and Chun-Ho Chen, all helped me a lot in my life. Certainly, the beautiful, kind and sweet secretaries, particularly Miss Vivian Ni, also aided me a lot in administration affairs. Moreover, the French international students, Lucie, Lilian and Thibault made my last half semester colorful. Anyhow, I would like to show my gratitude to these abovementioned people.

I also heartfeltly appreciate my senior classmate and my boyfriend, Jen-Yu Ray Fang for his wholehearted supports in academic study and in affection, keeping with me regardless of merriness or sorrow. His encouragement and love greatly motivates the birth of this thesis.

Finally, I have to extremely owe my most lofty esteem to my parents, my grandmother and my lovely younger brother, who always support me silently and love me endlessly. What I may accomplish today is inevitably cultivated by what they devoted to me.

Without these people, this thesis would never have seen the light of day.

Yu-Chieh Ricca Chen in June, 2005

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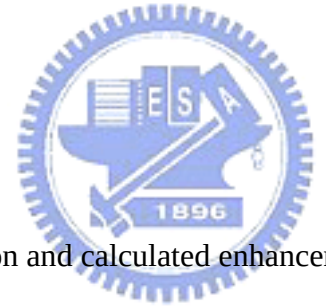

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