

中文摘要

光儲存科技在現今這個多媒體時代裡，扮演了一個非常重要的角色。在 DVD 或未來影音傳播及儲存系統中，增加儲存密度和縮短資料的存取時間是實現高品質多媒體傳播以及高密度資料儲存的唯一途徑。

近年來微機電製程技術在半導體產業的推波助瀾之下有許多重大的發展，對於微型化和質量輕的要求推動了更輕更小的光學資料儲存系統的發展，而微光機電技術(Micro Optical Mechanical System)是製造更輕更小的光學資料儲存系統的方法之一。

微光機電技術所製作之微光學讀取頭則是實現可攜式且大容量光學資料儲存系統的方法之一。本論文所指的微光學讀取頭是由微光學平台與可控聚焦透鏡所組成，所以必須藉由接合的方式將聚焦透鏡固定在正確的位置，而晶片之間的接合則必須對準，才能達成所需的光學特性。

論文第一部分嘗試利用濕式蝕刻的方式，製作 U-型溝槽與對應的凸型結構，做為兩晶片接合對準的機構，將其應用在微光學平台與可控聚焦透鏡，以確保其在水平方向能準確接合。

論文第二部分採用應力幾乎為零且結構較厚的 SOI(Silicon On Insulator)基板製作微鏡面，以避免傳統利用多晶矽製作微鏡面時所發生的翹曲現象。

除此之外利用高溫聚合的 SU-8 在降溫過程中所造成的張應力，製作一應力臂來抬升微鏡面。應力臂可避免微鏡面被吸附在基板上，且易於讓探針進入方便挑起微鏡面。利用 SU-8 製成的微光電元件及結構包括製成的栓鎖及應力臂。有別於一般常用的多晶矽製程，採用類似面型微加工製程，整合 SU-8 與 SOI 則可減少製程步驟。最終目標，製作出一 135° 微鏡面，此外在鏡面下亦整合了光二極體，以便能偵測光訊號。

Abstract

Optical data storage technology plays a key role in the multimedia era. In systems such DVD or future video-audio broadcast and information storage systems, it is crucial to increase the storage density and obtain rapid access time of information. The requirement of miniaturization and lightness pushes the development of more miniature and lighter optical data storage system.

Recently, the Micro Electro Mechanical Systems (MEMS) technology has many important developments with the rapid progress in the semiconductor industry. Micro optical pick-ups fabricated by Micro-Opto-Electro-Mechanical System (MOEMS) technology are one of the methods to realize portable high-capacity optical storage systems. In this thesis, the micro optical pick-up is composed of a micro optical bench and a controllable focusing lens bonded together. So, bonding and alignment of the focusing lens and actuator on the optical bench is important to achieve the specific of photology.

In the first part, wet etching is used to fabricate U-grooves and corresponding ridge structures as the precise horizontal alignment mechanism for the micro optical bench and the tunable focusing lens.

In the second part, silicon on insulator (SOI) wafers with almost zero stress are used in order to prevent the stress-induced curvature of micromirrors made by poly silicon. Integration of SOI and SU-8 in a surface-micromaching-like process can simplify the process. In addition, the tensile stress generated as the cross-linked SU-8 cools down from high temperature is used to fabricate stress beams to lift up the micromirror. SU-8 induced lifting stress beams can avoid stiction and make it easier to lift up the mirror by the probe. SU-8 is also used to fabricate anchors. Finally, photodiodes are integrated with a 135° micromirror to detect optical signals.

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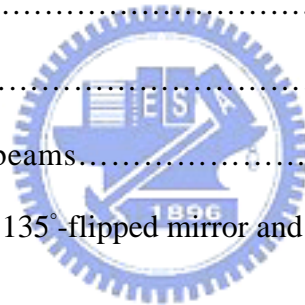
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