

基因晶片表面上的連結分子之研究

學生：林建輝

指導教授：祁 甦、徐 琅

國立交通大學 光電工程研究所 碩士班

摘 要

隨著 DNA 快速定序的時代來臨，基因晶片已經是一項必備的生命科學研究工具。由於它微小但高密度的優越特性，我們可以快速地從基因獲得龐大的生命資訊。而藉由半導體精密技術所製造的基因晶片，靈敏度可以分辨出單一鹼基的差異。現在，基因晶片不僅是用在生命研究與藥物研發上，它也將會在不久的未來改變現在的醫療型態，掀起一場文明的變革。

過去的基因晶片都是採用玻璃為基板，並以矽烷為連結分子。然而玻璃基材與矽烷分子的不好特性限制了其可靠性。在本篇論文裡，我們利用一種烯烴材料作為連結分子，發展了一項在矽晶圓上原位合成 DNA 的技術。我們的研究證實了 DNA 藉由這種連結分子固定在矽晶片的可行性。相信這項矽晶片上固定 DNA 的技術，可以作為微機電感測元件的更進階應用。

The study of Linker for DNA Immobilization on the Surface of a Gene Chip

Student : Chein-Hwui Lin

Advisor : Sien Chi, Long Hsu

Institute of Electro-Optical Engineering
National Chiao Tung University

Abstract

With the coming of the age of rapid DNA sequencing, gene-chip technology has already been an essential tool for the life science researches. Because of the compact and high density features, we are capable of mining massive genetic information. Moreover, the sensitivity of gene chip manufactured by semiconductor technology achieves to distinguish single nucleotide variation. Nowadays, gene chips are not only applied in the field of life science and drug development but will change the current clinical diagnostics and bring the revolution of civilization in the near future.

In the decade, the general technique of fabricating gene chips adopts glass for the substrate of gene chips and silane for the linker. However, the poor properties of glass and silane limit the reliability of gene chips. In this thesis, we develop a method of utilizing an alkene material for DNA *in situ* synthesis on a silicon wafer, and the feasibility of this method has also been demonstrated. We believe that this method of immobilizing DNA on silicon wafer is capable of advanced applications on micro-electromechanical sensing devices.