

# 懸浮結構應用於紅外線感測器之設計與製作

學生：郭定隆

指導教授：黃宇中 博士

國立交通大學電子工程學系 電子研究所

## 摘 要

微機電(MEMS)領域中，紅外線感測器具有非常高的發展潛力與應用價值。微機電系統若以矽微加工技術實現，可分為體塊微加工技術和表面微加工技術，其中表面微加工技術和一般積體電路(IC)整合性高、較易匹配且單位面積的積集度較高，對未來超大型積體電路系統之發展與整合可說是一項利基。

所以，本文選擇以表面微加工技術完成紅外線感測器懸浮結構的模擬及製作。因為考慮感測積體電路中鋁線的熔點，故懸浮結構採 CMOS 後段相容低溫製程。另外，本論文也對製程中會造成結構塌陷之因素做詳加探討，試圖先以電腦模擬各種可能狀況，並在實驗中隨時修正製程參數，最後，成功製作出低溫、低應力可應用於紅外線感測器的懸浮結構。(本論文由國防部中山科學研究院計畫補助，計畫編號：XV92G05P。)

# Design and Fabrication of Suspended Membranes for Microbolometer Applications

Student : Ting-Long Kuo

Advisor : Dr. Yu-Chung Huang

Department (Institute) of Electronics Engineering

National Chiao Tung University



## ABSTRACT

Infra-Red sensors are promising components in the field of MEMS. The technologies in MEMS can be divided into bulk micromaching and surface micromaching. Among them, surface micromaching is easier to be integrated and more compatible with integrated circuits(IC). Another advantage of surface micromaching is its high fill factor. Thus, surface micromaching is believed to be the niche of the ULSI generation.

In this work, we use the surface micromaching to fabricate suspended membranes for Infra-Red sensors (microbolometers). In order to avoid melting aluminum interconnects within the integrated circuit, all processes were done at low temperature. Furthermore, the computer simulation was used to predict and discuss all possible factors which may deteriorate the device performance. With these considerations, a good suspended membrane for microbolometer applications, with low residual stress and processed at low temperature was successfully realized.