Y2023-24 第十二屆
封裝產學技術合作-新案媒合說明會

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ASE HR
07-3617131 # 86094

Y2023.08.02

aseglobal.com

Need To Know 原則公告

會議機密 - 四「不」原則

不轉述

不告訴或不與會議以外之相關人員討論

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不將會議記錄轉寄給會議以外之人員

不邀請

不擅自邀請與會議討論議題不直接相關之人員

不揭露

不揭露產品功能在郵件、文件及會議中

第12屆封裝技研合作
(執行期間 2023.10-2024.9)

1 2023年6-8月 專案媒合

- **第一階段:**
  2023年專案計劃說明會
  → **8/2(三) 學校公開媒合說明**
  → **8/18(五) 回收媒合意願**
- **第二階段: 9月專案媒合審議**

  →**公佈合作名單**→正式計劃書提出

專案執行

2 2023年9-10月 合約簽訂

- 合約擬定→法務審核→簽約→專案執行
- **計劃期程:**

  2023.10.1~2024.9.30

專案執行

3 2024年3-4月 期中驗收

- 期中截點: 2024年3月31日
- **期中發表會: 2024年4月**

4 2024年9-10月 期末發表

- 內部驗收: 2024年9月
- **發表日期: 2024年10月**

日月光第12屆封裝技研合作媒合提案表<Y2023.10~Y2024.09>

Projects x 13

序	Project	Site	專案窗口
1	1.晶圓表面處理方法對於防潑水原理及機制之研究	CPE	陳俊雄經理#17672
	2.乾式清潔/移除產品表面微細異物的方法		洪肇輿副理#17680
2	3.mmWave AiP design	CDE	鄭宏祥經理#15871 吳承佑#85827
	4.Substrate design automation		
3	5.應用於光學測試系統之機構同軸對位校準方法開發	CTE	朱偉碩副理#84531
	6.測試板中低損耗 60GHz 毫米波信號傳輸方法與分析		涂振嘉經理#84513
4	7.釘架鍍銀晶粒形成與 Stitch Bond 結合影響分析	WB	許勝翔副理#14203
5	8.AI自動化Simulation Model Mesh系統開發 (延續案)	FC	鄭博仁經理#15765
	9.Cover Jig Tooling Design and Bare Substrate Warpage Improvement By AI technology (延續案)		
6	10.電鍍技術精進 – 晶圓平整度改善應用於多重開孔設計	Bumping	黃友發經理#15390
	11.無機或低有機型去光阻劑		葉力榮副理#17371
7	12.Quick lens topography measurement system (延續案)	SiP	彭勝揚經理#12388
	13.奈米結構近紅外光濾光超穎介面材料之最佳化設計與製造 (延續案)		鍾啟生經理#15233

1.晶圓表面處理方法&結構設計對於防水原理&機制之研究

Research on the Principle & Mechanism of Water Proof by Wafer Surface Treatment & wafer structure design

(ASE專案負責人: Taihung Kuo/Curtis Chen)

Description : Understand the design of wafer surface structure for water proof:
a. Need a school team that can do this structure
b. How should the size of the Media hole be designed so that the atomized water droplets cannot enter the structure?
c. Whether the wafer structure itself can use doping and other elements to achieve the principle & mechanism of water proof
d. The principle & mechanism of using coating technology on the surface of the wafer to achieve water proof(without affecting air permeability) (fluorine-containing & non-fluorine)

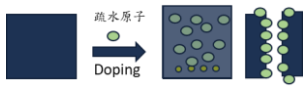
ASE Expectation :
a. 需有可以做此結構的學校團隊
b. Media hole 開孔形狀,尺寸,深度該如何設計可以讓霧化水滴無法進入結構內部?
c.晶圓結構本身是否可利用doping 其他元素達到防水之原理&機制
d.晶圓表面利用披覆技術達到防水(不影響透氣性)之原理&機制

KPI Definition
a. Media hole 開孔形狀 & 尺寸 & 深度設計可達到防潑水功能
b. Doping 結構分析之鑑定方法
c. 披覆材料在晶圓表面結構分析之鑑定方法
d. 晶圓IC表面疏水性/透氣性/滲水性/耐久性測試 & 方法建立 & IP 防塵防水等級認證

Regular Meeting
每月第二週

Team Members
計劃主持人: Louie Huang 處長 (ASE) / _____ 教授
ASE Leader: Curtis Chen/Taihung Kuo/Anderson Chen

1.須能設計此防潑水結構
2.Media hole 尺寸, 深度,開孔形狀如何設計可以防水
3.尺寸結構鑑定
4. 疏水性測試 for 晶圓IC
5. 透氣性測試 for晶圓IC
6. 滲水性測試 for晶圓IC
7. 耐久性測試 for晶圓IC



1.Doping 結構鑑定
2.疏水性測試 for晶圓IC
3.透氣性測試 for晶圓IC
4.滲水性測試 for晶圓IC
5.耐久性鑑定 for晶圓IC

1.Coating 材料結構鑑定
2.疏水性測試 for晶圓IC
3.透氣性測試 for晶圓IC
4.滲水性測試 for晶圓IC
5.耐久性鑑定 for晶圓IC

2.乾式清潔/移除產品表面微細異物的方法
The Method of Dry Cleaning/Removing Particle on Product Surface
(ASE專案負責人: Ricky Yang / JerryJU Hung)

Description :

光電及視覺應用產品封裝由於對表面清潔度需求相當高的，但無塵室作業環境及製造過程中會有微粒子（PM，particulate matter）殘留或靜電吸附於產品表面上，希望能建立有效、快速的移除異物又不影響產品功能或外觀的清潔方法

ASE Expectation :

1. 各種可行性的清潔/移除附著物附著原理 & 移除機制
1.1 非水洗 (乾式物理性) 、不殘留、整體性，含產品表面、溝槽清潔
1.2 清潔/移除的特性，不得影響產品功能及破壞結構或表面產生刮痕
2. 清潔方法須能移除有凹槽結構 > 6 um 之異物

KPI Definition:

對應附著物質之不殘留的清潔/移除方式及材料、設備

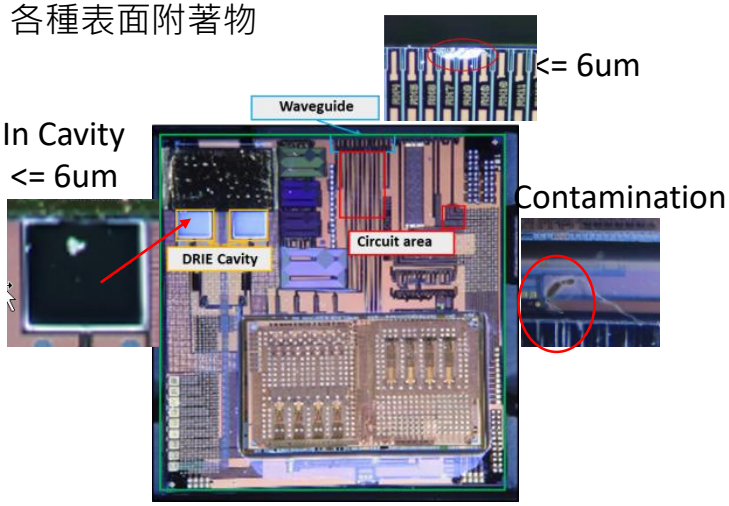
Regular Meeting:

2nd week per month

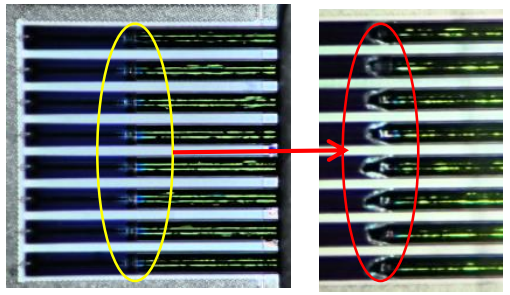
Team Members:

計劃主持人: 黃文彬 處長 (ASE) / _____ 教授
ASE Leader: 洪肇輿

各種表面附著物



水流壓力造成表面結構破壞



3.毫米波封裝天線設計
mmWave AiP (Antenna in Package) Design (ASE專案負責人: 鄭宏祥)

Description :
To study the know-how for mmWave AiP design, includes the antenna and feeding network design. For antenna design ,we focus on the higher frequency up to Sub- Tera Hz range for beyond 5G or 6G application. In feeding network section, we focus on the broad band feeding network design to address the ultra wide band impedance matching problem.

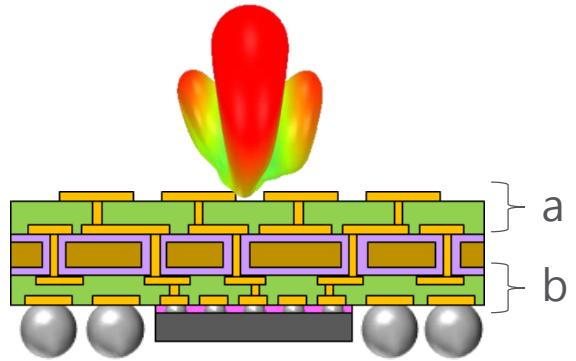
ASE Expectation :
1. 3GPP specification study for B5G/6G target frequency band research .
2. Sub-Tera Hz antenna theory research and structure design.
3. Broad band feeding network theory research and structure design.
4. Antenna design guideline and flow establishment.

KPI Definition
1. Bandwidth: 7 GHz (116-123 GHz)
2. Peak gain: > 4 dBi

Regular Meeting
雙週會

Team Members
計劃主持人:丁一權 處長 (ASE) / 林根煌 教授 (NCKU or NSYSU)
ASE Leader: 鄭宏祥

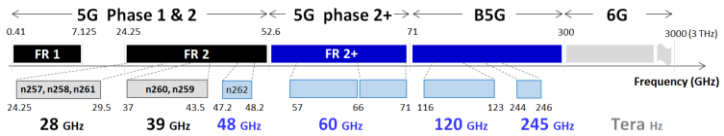
➢ **mmWave AiP**



a. Radiation Elements:
- GHz → Sub-Tera Hz

b. Feeding Network:
- Broad band matching
- Diplexer integrated

➢ **5G/B5G/6G Specification**



4.基板設計自動化 - AI 最佳佈局規劃

Substrate Design Automation - AI Optimal Layout Planning.

(ASE 專案負責人:鄭宏祥)

Description :

To study the know-how for layout planning through AI and find the optimal the best place where the signals goes out of the die area.

ASE Expectation :

1. Investigating Signal Grouping and layering with AI.
2. Determine the action for each signal (ex. adding a via or routing or connection to the same signal)
3. Determine the direction of the signal fan-out.
4. Determine the orientation of the via structure.
5. Using AI to study the best route for signal fan-out in die area.

KPI Definition

1. Signal fan-out of the die area match rate by each layer:100% (expect Power/Ground net)
2. With the Auto Router of Cadence, the routing completion rate can reach 90%

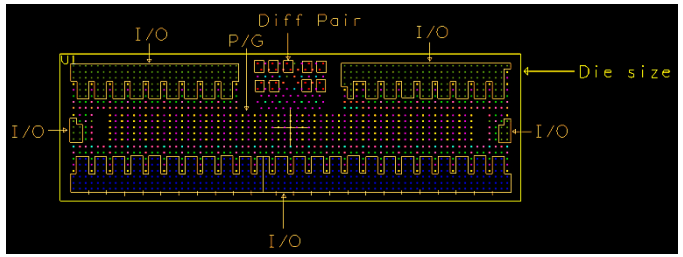
Regular Meeting

Biweekly meeting

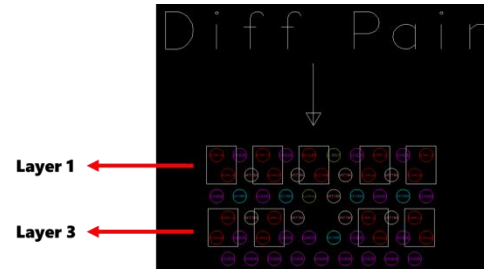
Team Members

計劃主持人:丁一權 處長 (ASE) / _____ 教授 (NCKU or NSYSU)
ASE Leader: 鄭宏祥

Signal Grouping

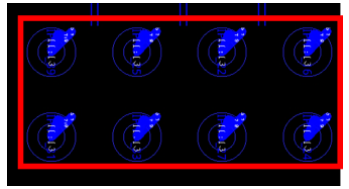


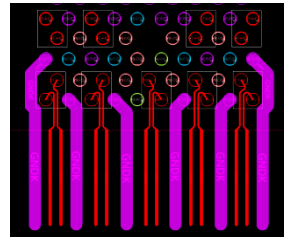
signal layering



Judging the action & direction

Judging the orientation





5.應用於光學測試系統之機構同軸對位校準方法開發
Development of a mechanism coaxial alignment calibration method applied to an optical test system

Description :

One of the key factors for testing optical products is to ensure that the hardware setup is coaxially aligned. This is especially crucial for measuring the beam propagation angle characteristics, as any misalignment can cause significant errors in the results. For optical products with lens modules or multi-laser beams, this becomes even more challenging. Therefore, we plan to develop a method to calibrate and verify the coaxial alignment of the optical test system hardware, which involves setting up the test hardware properly and controlling the relative position of motion stages.

ASE Expectation :

1. Develop a method to align and calibrate the coaxial alignment of the optical test system based on its output laser beam, camera images, and motion stages positions.
2. Obtain the alignment parameters for all motion stages to achieve coaxial alignment.
3. Enable the method to be integrated into an automatic calibration test program.

Academic Expectation :

KPI Definition

1. Establish set-up rules for the multi-axis optical testing system
2. Develop calibration and verification methods for coaxial alignment of DUT with the test instrument
3. Ensure validation angle is within 0 +/- 0.5 degrees accuracy

Regular Meeting

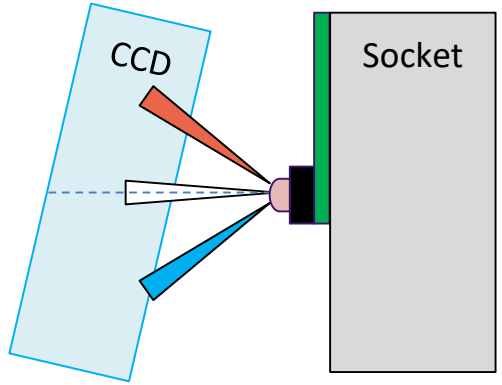
Every forth week

Team Members

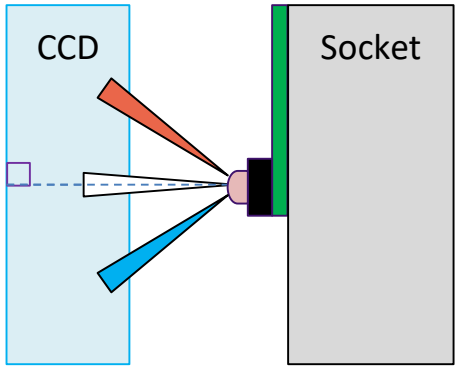
計劃主持人: Roger Hwang資深處長 (ASE) / _____ 教授 (NCKU or NSYSU)

ASE Leader: Boris Chu

Non-Coaxial alignment



Ideally-Coaxial alignment



6.測試板中低損耗 60GHz 毫米波信號傳輸方法與分析
Low loss 60GHz mmWave signal delivery method design and analysis in test board

Description : To design test boards that can support low loss 60GHz mmWave signals and to derive the design rule.

ASE Expectation :

1. To design the PCB pattern for low loss 60GHz mmWave signal delivery (see Figures 1 & 2)
2. To establish the simulation model and to derive the design rule for path loss prediction in the test board
3. To build and provide two 60GHz test boards for verification by ASE

Academic Expectation :

KPI Definition:

1. To design the low-loss mmWave 60GHz signal path in the test boards under the dimensions constrain (see Figure 1) :
   a). S21(A-> B) > -1dB @60GHz
   b). S11(A-> B) < -10dB @60GHz
   c). BW_{-3db}(A-> B) > 5GHz @60GHz

Regular Meeting

Monthly

Team Members

計劃主持人: Roger Hwang資深處長 (ASE) / _____ 教授 (NCKU or NSYSU)

ASE Leader: CC Tu

Figure 1 :

Signal delivery structure no limited

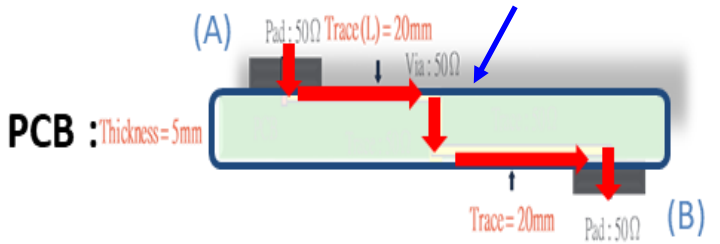
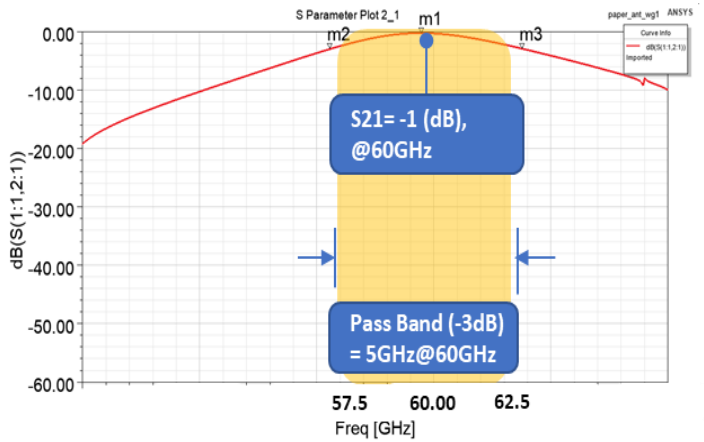


Figure 2 :



7.釘架電鍍金屬層晶粒結構與WB Stitch Bond作業性影響分析

Analysis the effect of plating metal layer grain structure formation and stitch bond workability

(ASE專案負責人: DavidDW Lo / Dylan Hsu/ Freddy Kao / Vincent Yeh / TH Yu)

Description : 相同產品在WB製程使用相同的參數及Tooling的狀況下, 使用不同廠商釘架在作業狀況表現上有明顯差異, 經分析結果發現在電鍍晶粒形成的grain size較大的釘架作業性較差

ASE Expectation :

1. How to control plating deviation (Ag or Ni/Pd/Au thickness / Roughness / Brightness / Grain Size etc..)
2. To understand the effect of plating metal layer grain size and stitch bond
3. To optimal parameter setting of different plating metal layer grain structure result
4. To understand plating grain size formation theory and which result is the best for stitch bonding

Academic Expectation :

KPI Definition

1. To define metal plating control method , reduce vendor process differences
2. To define optimal stitch bond shape or parameter application for different metal plating

Regular Meeting

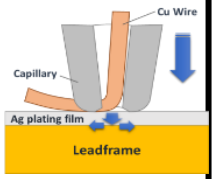
每月第二週

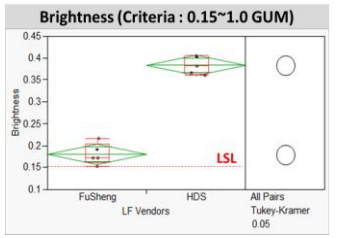
Team Members

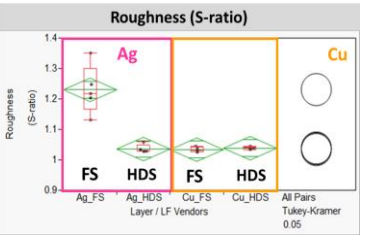
計劃主持人: 張哲欽 處長 (ASE) / _____ 教授 (NCKU or NSYSU)

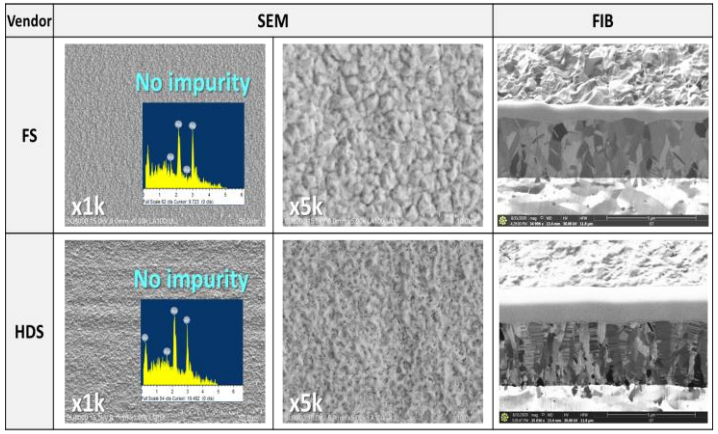
ASE Leader: Work Chang

LF Vendors	Device	AVG 2nd Bond TS PPM	Wire Bond Condition	
			Recipe	Wire
HDS	The same	32 (25~67)	Same Parameter Tooling	18um, Cu_Pd
FS		258 (215~302)		









8.AI自動化Simulation Model Mesh系統開發 (2023延續展延)

Description :
The simulation model can be used to simulate stress and warpage, but before the simulation, it needs to do a lot of pre-processing including grid segmentation, it always takes a lot of time to model mesh, and it can only eliminate errors one by one through experience. Therefore, for It is very important to build an artificial intelligence automated model mesh system.

ASE Expectation :
1. Develop an AI automated system for simulation model mesh.
2. Combination of the previous automatic correction system and new model mesh system.
3. Research and develop new methods and automation processes for the model mesh process..

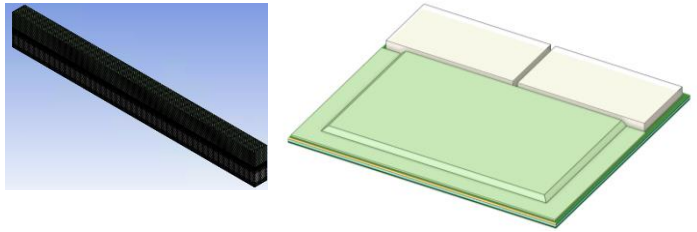
Academic Expectation :

KPI Definition
1. AI automated mesh system of finite element .
2. The efficiency of model segmentation is increased by at least 150%.

Regular Meeting
每月第二週

Team Members
計劃主持人: XXX 處長 (ASE) / _____ 教授 (NCKU or NSYSU)
ASE Leader: XXX

PKG model



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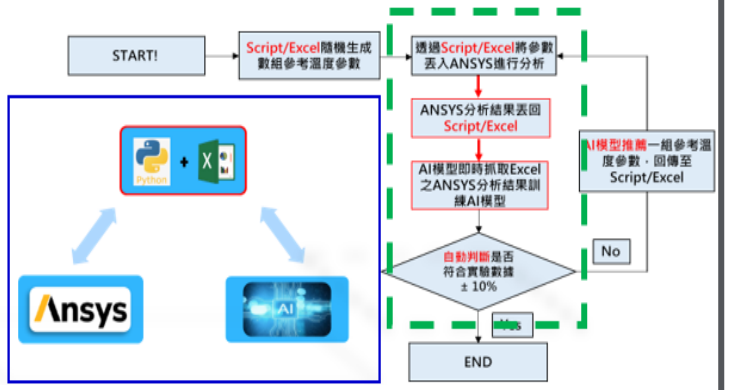
AI model



9.Cover Jig Tooling Design and Bare Substrate Warpage Improvement By AI technology (2023延續展延)

Description : Use AI technology to find out the most effective combination of cover jig design to improve the warpage and nun-wetting issue of the bare substrate

ASE Expectation :

1. To build the AI model for the combination and matching of the base substrate and cover jig
2. To apply existing actual combinations to get validated
3. To use simulation result to generate a large amount of virtual data and compare with the AI model
4. To use AI jig & boat model instead of manual interpretation to reduce non-wetting issue

KPI Definition

1. To build an AI jig & boat model
2. Use the simulation results to match the AI model

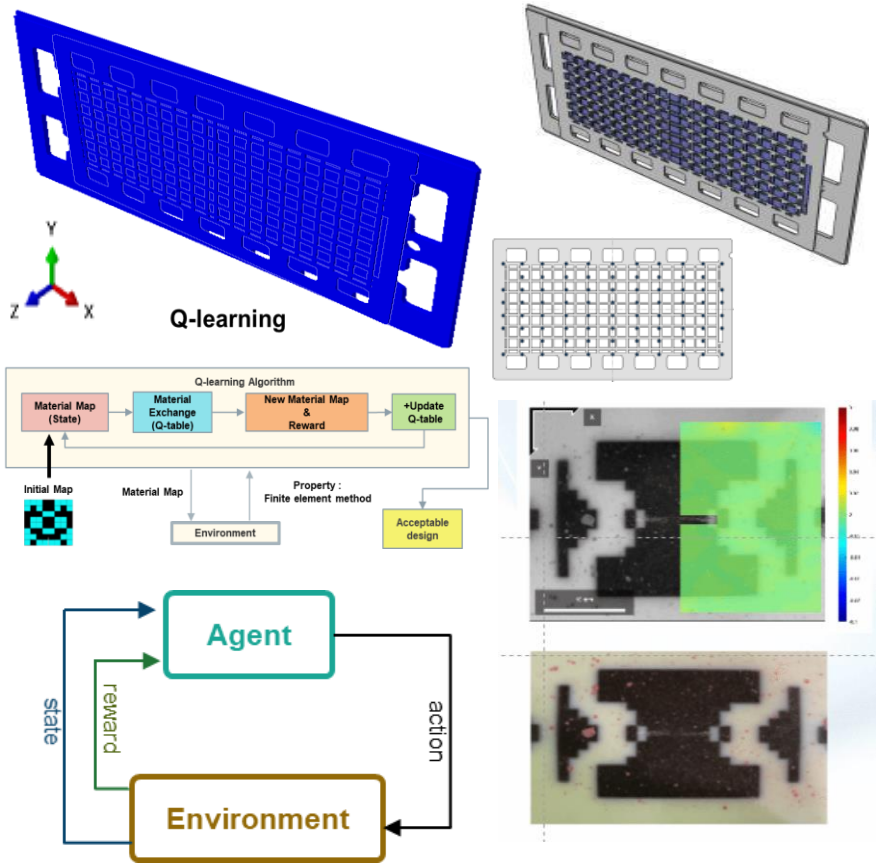
Regular Meeting

每月第二週

Team Members

計劃主持人: XXX 處長 (ASE) / _____ 教授 (NCKU or NSYSU)

ASE Leader: XXX



10.電鍍技術精進 – 晶圓平整度改善應用於多重開孔設計

Larger die size and Multi open design application for BHCOP improvement **(ASE專案負責人: Watt NG)**

Description : High end product phase in, Large die size and multi open design cause worse BHCOP, To understand the effects of BHCOP factor including Plating solution / Current filed/ Flow rate….

ASE Expectation :

1. To understand the effects of BHCOP factor, Plating solution properties (Include Current density / temp / flow…)
2. To have design rule of conditions for multi opening packages
3. Simulation model to predict BHCOP value

Academic Expectation :

KPI Definition

BHCOP simulation module (Input: Multi open density / die size / lay out, Out put: BHCOP)
Optimize parameter solution for lower BHCOP

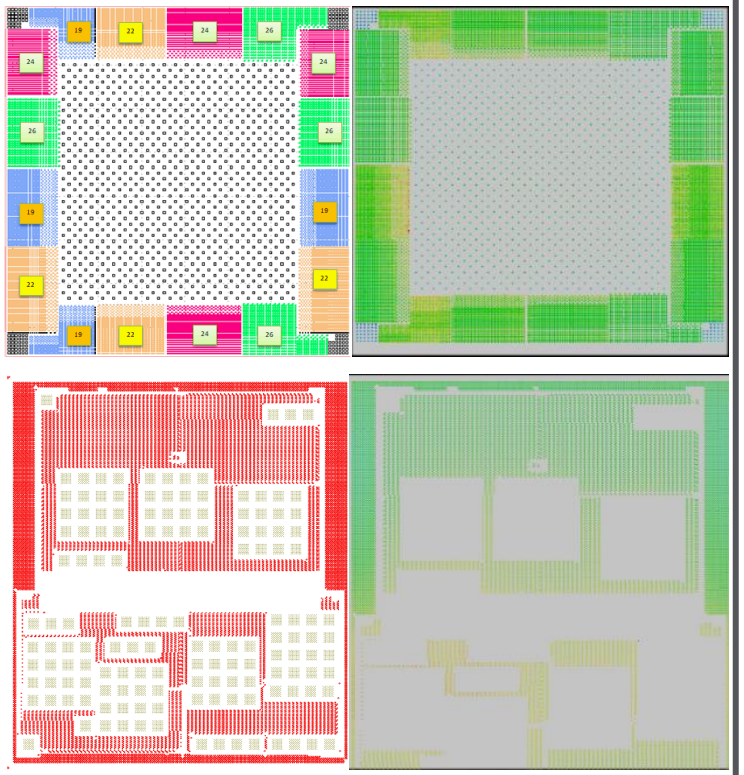
Regular Meeting

每月第二週

Team Members

計劃主持人: 黃友發 經理
ASE Leader: Arles Huang/ Shihhao Huang

Schematic of die design & BHCOP distribution



11.無機或低有機型去光阻劑
Inorganic or low organic photoresist stripper **(ASE專案負責人: Lilong Yeh)**

Description : Develop inorganic or low organic materials to reduce environmental costs

ASE Expectation :

1. To develop effective PR stripper without NMP/DMSO/TMAH (or other prohibited chemicals)
2. Ability of new striper are better or same with NMP/DMSO base.
3. No damage for re-passivation layer (PI/PBO)
4. Photoresist remover that does not pollute the environment

Academic Expectation :

KPI Definition

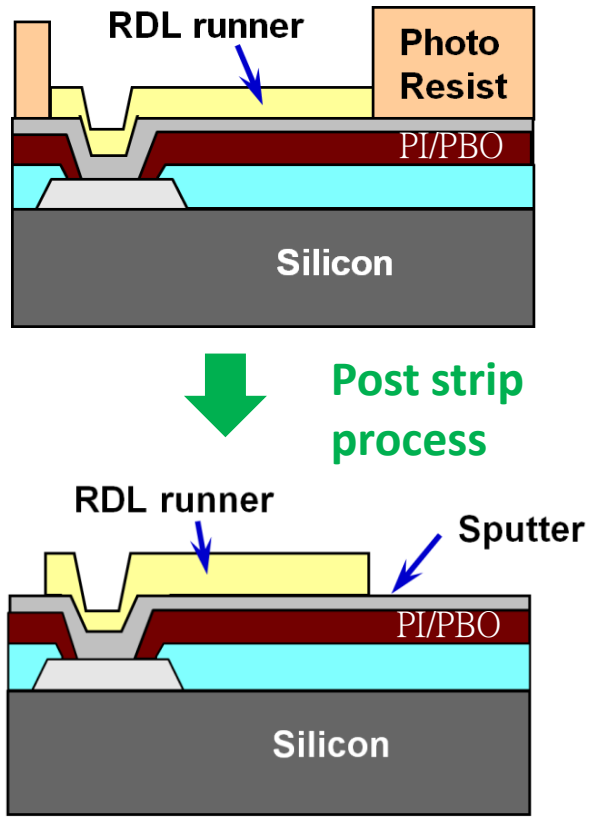
8’ wafer 10um PR: strip life time > 7 days, loading > 3500pcs, re-passivation w/o damage
8’ wafer 70um PR: strip life time > 5 days, loading > 1000pcs, re-passivation w/o damage

Regular Meeting

每月第二週

Team Members

計劃主持人: TH 處長 (ASE) / _____ 教授 (NCKU or NSYSU)
ASE Leader: Lilong Yeh



12.Quick lens topography measurement system

(ASE專案負責人: Muster Wang)

Description : Inspection methodology for topography of lens in barrel with non-contact technology, current ASE have no inspection capability to measure back surface SAG

ASE Expectation :

1.Build up inspection system for lens IQA and FA

2. Target to obtain topography within 5min

Academic Expectation :

Knowledge of metrology of optical inspection in SIP module

KPI Definition

Non-contact inspection system to recognize lens sag OOS

Regular Meeting

Bi-weekly

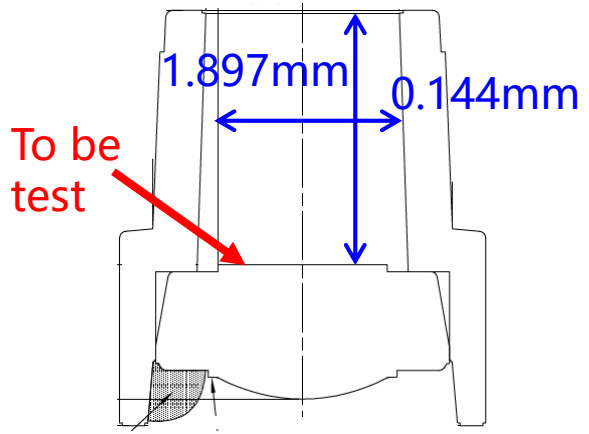
Team Members

計劃主持人: 王盟仁處長 (ASE) / NSYSU 林元堯教授

ASE Leader: 彭勝揚 經理 /柯俊宇

ASIS

- Vendor to use high price instrument to measure BFL but no inner surface data obtained
- ASE have no capability to measure inner topography



TOBE

- non-contact topographic measurement

13.奈米結構近紅外光濾光超穎介面材料之最佳化設計與製造 (延伸案)

Optimization of material semiconductor manufacturing for Nano structure of multi-layer IRCF

(ASE專案負責人: Anderson Chung)

Description : Meta-surface structure film for replacing IRCF and reaching the goal of ultra thin optical module

ASE Expectation :

1. Meta-surface (multi-layer) structure film with high VIS pass & IR stop performance
2. To replace PMMA material to avoid IR cut performance change before/after REL
3. To improve top/ bottom layer pattern shift issue during pattern heat-printing
4. Better adhesion force at those ultra thin film post REL

Academic Expectation :

KPI Definition

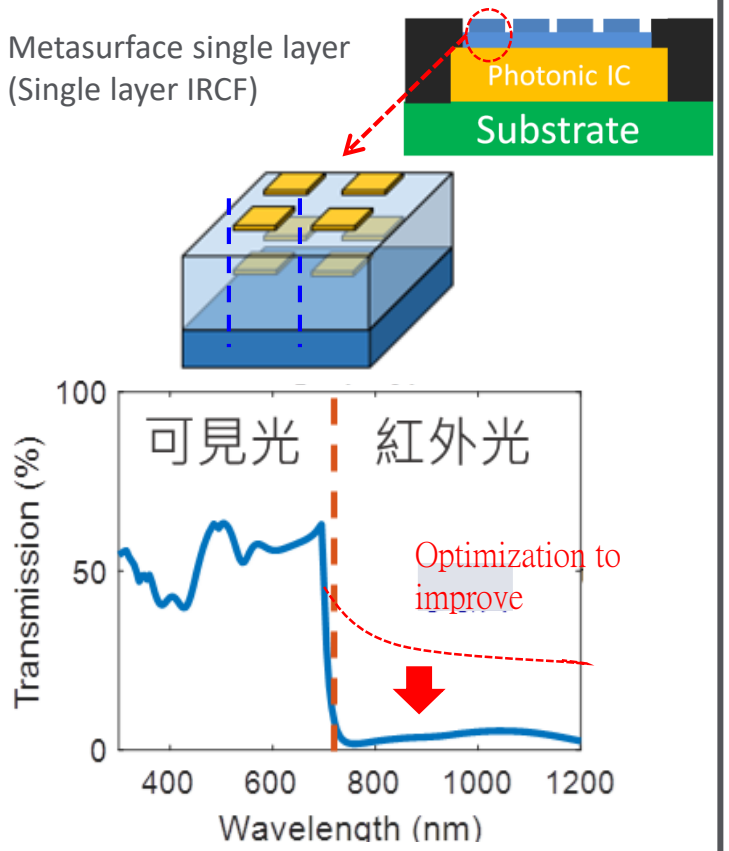
Metal pattern shift
IR cut performance before/after REL
Adhesion force post reliability (heat soak and thermal cycle)

Regular Meeting

每月第二週

Team Members

計劃主持人: 王盟仁 處長 (ASE) / 林俊宏教授 (NCKU_光電)
ASE Leader: Anderson Chung 經理



Thank you