

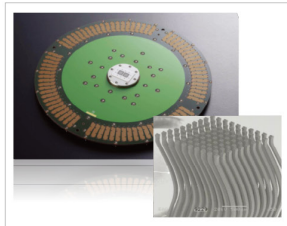
마이크로 습식 도금기술

Micro Electroplating Technology

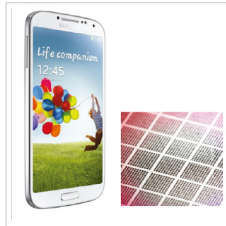
TRL7

기술내용

• 전자·전기·반도체 부품의 고집적화·박형화·다기능화 흐름 (금속 패턴 Size, Pitch, Array 등) 대응을 위한 고성능 도금액 및 협피치 대응 자원가 프로브 핀 제조공정 개발



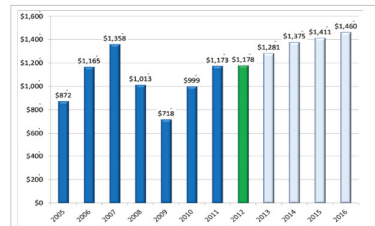
반도체 검사 부품 : 협피치화, 고정밀도



모바일 광학부품 : 고전도도, 고투광도



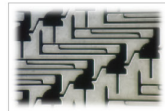
2차전자 집전체: 고전도성, 높은 표면적



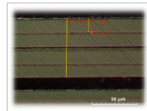
기술 적용 대상 부품 - 프로브 카드



프로브 카드



프로브 핀



고기능 다층도금

프로브 카드

- 소모성 제품 (수명 6개월 ~ 1년)
- 고가 (수 천만원~1.8억원/장)
- 반도체의 고집적화 추세
- 프로브 팁 전극 재료: Ni 합금
- 요구 사항
 - 대면적 웨이퍼 probing 능력
 - 미세 가공 능력
- 문제점
 - 고가 MEMS 공정 적용
 - 긴 납기 대응
- 주요공정
 - MEMS 공정 높은 정밀도, 막대한 자본 투자, 까다로운 제조 공정, 높은 공정 운영비

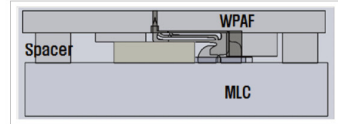
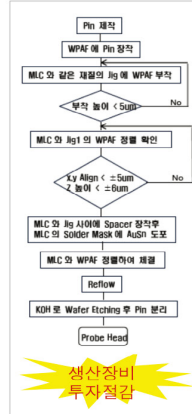
확보 기술

- 기능성 Ni 합금 도금액
 - 저응력 0.2kg/cm²
 - 전기전도도 10MS/m
 - 고경도 Hv. 700 이상
- 표면 후처리 기술
- 최외각 기능성 도금
- 후 열처리 기술
- 신 전주 공정 개발
- 공정원가 절감 효과 12~25%

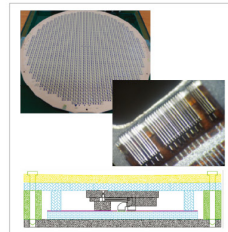
Ni/Cu 합금 + 미세패턴 + 저가공정

우수성

저원가 프로브 헤드 제작 및 카드 조립



Probe Pin Array Frame을 활용한 높은 위치 정밀도 확보

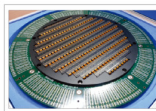


특징 : Probe Head에 Pin의 위치 정밀도를 최적화하여 일괄 접합
⇒ Probe Head 생산장비 투자 절감

사업성

시장성

- 국내 시장은 Samsung과 SK Hynix로 주거래 업체들이 나누어 있음
- Flash Memory PC시장: 1,550억 원 (국내 업체 과점)
- DRAM PC시장: 1,700억 원 (해외 업체 과점 95%)



사업 및 기술 동향

- 3D MEMS 방법 적용 회사 (FORMFACTOR(미국), MF, Solbrain MEMSYS)
- 2D MEMS Pin의 Laser Bonding 방법적용 회사 (MJC(일본), KI, TSE, AMST)
- DRAM PC 신규 개발 업체는 고가의 Laser Bonding 장비 사용 방법 채택

기대효과

- 자원가 2D 전주공정 개발 및 고가 제조 장비 불필요 ⇒ 프로브 핀 제조 원가 절감 (12~25%↓) 및 기능 고도화
- Probe Head에 부착되는 Pin의 위치 정밀도 최적화 ⇒ Probe head의 Pin 위치 정밀도 향상
- Probe Head 제작 기간 단축으로 인한 납기 대응력 우수

이전 가능 기술

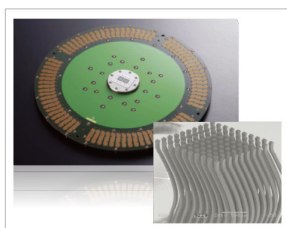
- 고경도, 저응력, 고전도성 Ni 합금도금액 제조 기술
- 고정밀 도금 공정기술

Micro Electroplating Technology

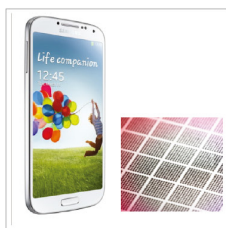
TRL7

Technology Overview

- Electric, electronic and semiconductor parts are getting more integrated, thinner and more multi-functional in terms of metal pattern size, pitch and array.
- This technology pertains to fabricating a highly functional plating solution and low cost probe pins.



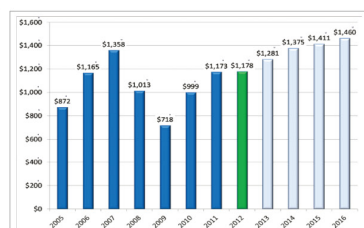
Semiconductor tester parts
: Narrow pitch, high precision



Mobile optical parts
: High conductivity, high transparency



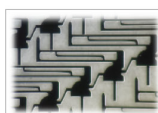
Secondary cell collector
: High conductivity, high surface area



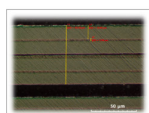
Global market prospects for probe cards and distribution of different types



Probe card



Probe pin



Highly functional multi-layer plating

Probe card

- Consumable (6 months to 1 year)
- Expensive (~0.2 billion won/sheet)
- High density integration of semiconductors
- Electrode materials for probe tip: Ni alloys
- Requirements
 - Large-area wafer probing capability
 - Fine processing
- Problem
 - Expensive process using MEMS
 - Long delivery
- Key process
 - MEMS process** High precision, heavy capital investment, fabrication process demanded, High process operating cost

NiCu alloy

Fine pattern

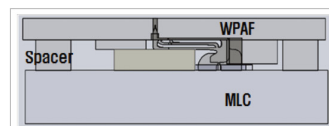
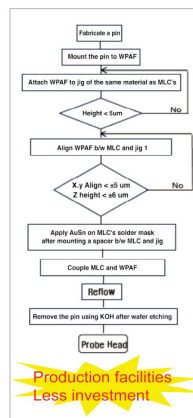
Low cost process

KIMS' technology

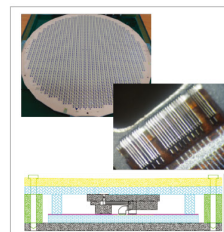
- Functional Ni alloy plating solution
 - Low stress (0.2kgf/cm²)
 - Electric conductivity (10MS/m)
 - High hardness (Hv2700)
- Surface post-treatment
- Outermost functional plating
- Post heat-treatment
- Advanced electroforming process
- Cost saving process (12-25%)

Highlights and Strengths

Low cost probe head: fabrication and assembly



High position precision using probe pin array frame



Features Simultaneous attachment to the probe head with their optimized position precision => Less investment for probe head production facilities

Business Cases

Markets

- The Korean market dominated by Samsung and SK Hynix
- Flash memory PC market: 155 billion won (dominated by domestic makers)
- DRAM PC market: 170 billion won (dominated by international makers)



Trends in business and technology

- 3D MEMS method users: FORMFACTOR (U.S.), MF, Solbrain MEMSYS
- Users of 2D MEMS pin laser bonding: MJC (Japan), KI, TSE, AMST
- DRAM PC makers tend to choose expensive laser bonding equipment

Benefits

- No need to use expensive fabrication facilities
 - ⇒ Cost savings (12-25%) for probe pin production and more sophisticated functionality
- Optimization of positions when pins are bonded to probe head
 - ⇒ Higher precision pin position with probe head
- Faster delivery due to faster production period of probe heads

Transferable technology

- Know-how of solution to fabricate Ni alloy plating having high hardness, low stress and high conductivity
- Simple manufacturing process combined with a precision plating