

# 集成电路先进封装与系统集成关键技术研发与产业化

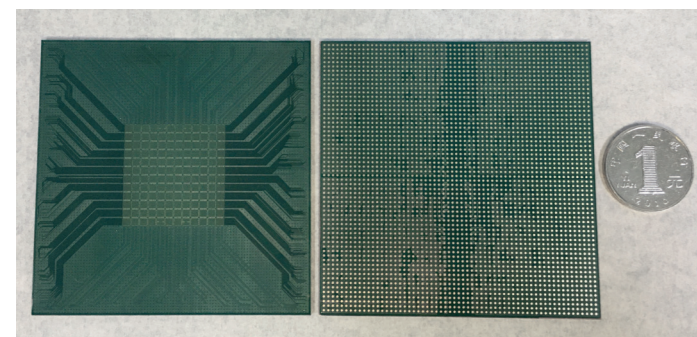
# The Key Technology R&D and Industrialization of Advanced IC Packaging and System Integration.

## 成果简介:

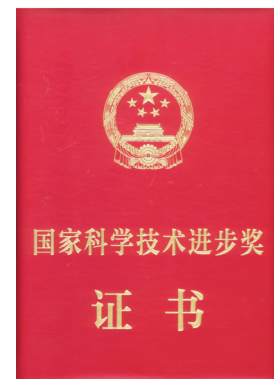
围绕集成电路先进封装与系统集成技术，以人工智能AI、超算CPU封装等应用需求为牵引，团队突破了12吋硅转接板、晶圆与板级扇出封装、高密度倒装基板等2.5D/3D集成核心技术，在国内率先建成先进封装前瞻性技术研发公共平台，构建了较为完整的自主知识产权体系。同时，面向国内集成电路企业广泛开展技术服务，带动了我国设计、封测、装备、材料产业链条协同发展。

## Introduction:

Focusing on advanced IC packaging and system integration technology driven by the application demand of artificial intelligence and supercomputer CPU packaging, the team has made a breakthrough in 2.5D/3D integration key technology, including 12 inch silicon interposer, wafer and panel level fanout packaging, high-density flip substrate, etc. Meanwhile the team takes the lead in building a public platform for advanced packaging and prospective technology research and development in China, and has constructed a relatively independent intellectual property rights system. The team also provides extensive technical services for domestic IC enterprises, and promotes the coordinated development of chinese designing, packaging, testing, equipment and material industry chains.



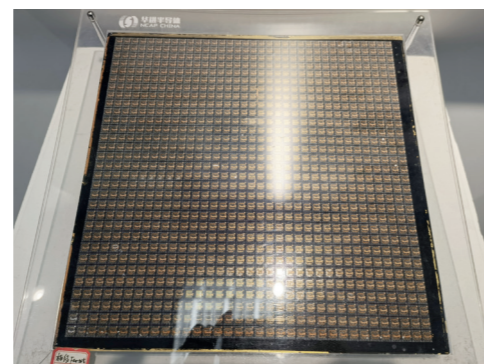
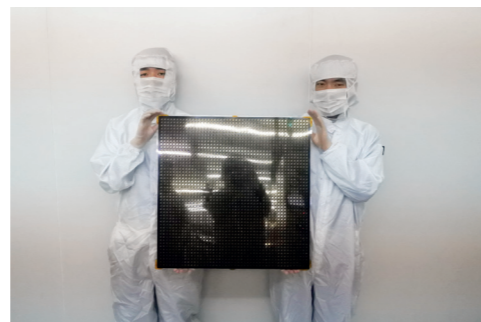
FCBGA 基板  
FCBGA substrate



科技奖励证书  
Science and technology award certificate



国家集成电路特色工艺及封装测试创新中心  
National innovation center for integrated circuit special process and packaging & testing



板级扇外型封装  
Panel level fan-out packaging

## 推荐单位 / Recommended Unit

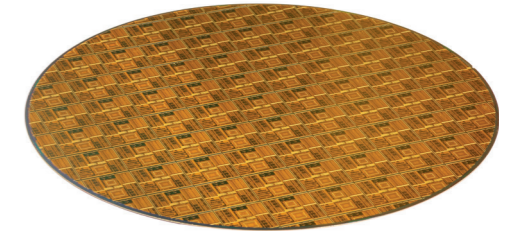
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Institute of Microelectronics, Chinese Academy of Sciences

## 完成单位 / Accomplished Unit

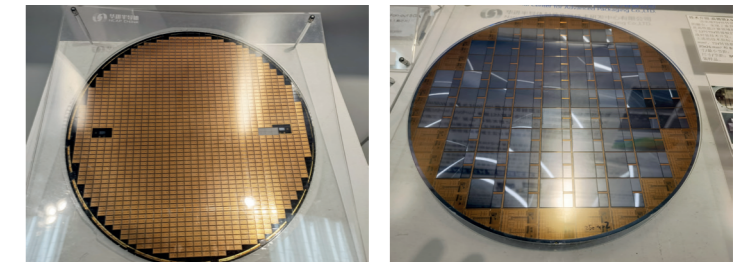
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## 合作单位 / The Main Cooperation Units

- 华进半导体封装先导技术研发中心有限公司  
National Center for Advanced Packaging Co., Ltd.
- 江苏中科智芯集成科技有限公司  
Jiangsu Zhongke Intelligence Chips Integrated Technology Co., Ltd.
- 江苏长电科技股份有限公司  
Jiangsu Changjiang Electronics Technology Co., Ltd.
- 华天科技（西安）股份有限公司  
Huatian Technology (Xi'an) Co., Ltd.
- 通富微电子股份有限公司  
Tongfu Microelectronics Co., Ltd.
- 展讯通信（上海）有限公司  
Spreadtrum Communications, Inc.
- 深南电路股份有限公司  
Shennan Circuits Co., Ltd.
- 深圳市中兴微电子技术有限公司  
Sanechips Technology Co., Ltd.
- 武汉新芯集成电路制造有限公司  
Wuhan Xinxin Semiconductor Manufacturing Co., Ltd.
- 深圳德邦界面材料有限公司  
Shenzhen Darbond Interface Material Co., Ltd.
- 有研亿金新材料有限公司  
GRIKIN Advanced Material Co., Ltd.
- 安集微电子（上海）有限公司  
Anji Microelectronics Co., Ltd.



12 吋硅转接板晶圆  
12 inch silicon interposer wafer



12 吋扇外型封装晶圆  
12 inch wafer level fan-out packaging

## 社会效益和经济效益:

2012年，团队以技术成果作价出资成立华进半导体封装先导技术研发中心有限公司（简称“华进半导体”）。2020年，华进半导体获批国家集成电路特色工艺及封装测试创新中心。团队研发的核心技术在设计和封装行业龙头企业实现应用，近三年微电子所与孵化企业在先进封装与系统集成领域实现销售收入3.99亿元。截至2020年底，通过核心技术转移转化、知识产权使用许可等方式，带动相关国内企业实现封测产值50.62亿元，间接带动国内集成电路封测装备、材料企业实现销售约20亿元。

## Social and Economic Benefits:

National Center for Advanced Packaging Co., Ltd. (NCAP) was founded in 2012 with the technology achievements as capital contribution. NCAP was approved as the national innovation center for integrated circuit special process and packaging&testing in 2020. The key technology developed by the team has been applied in the industry leading giant enterprises in the fields of designing and packaging. In recent three years, IMECAS and incubation enterprises have achieved a total sales revenue of 399 million yuan through advanced packaging and system integration. By the end of 2020, it has driven relevant domestic packaging and teting enterprises to realize sales value of 5.062 billion yuan through the transfer of key technology and IPs, and indirectly driven domestic integrated circuit equipment and material enterprises to achieve nearly 2 billion yuan sales revenue.



## 团队成员 / Team Members:



曹立强  
Cao Liqiang

中国科学院微电子研究所  
主要贡献：团队负责人，提出硅转接板晶圆加工工艺，发明核心关键技术，构建知识产权体系，组织技术开发与产业化。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: Team leader, proposing the process of silicon interposer, inventing key technology, constructing intellectual property rights system, organizing the development and industrialization of the technology.



于中尧  
Yu Zhongyao

中国科学院微电子研究所  
主要贡献：先进封装基板工艺开发与产业化。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of advanced substrate and application promotion.



王启东  
Wang Qidong

中国科学院微电子研究所  
主要贡献：系统集成关键共性技术开发。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of system integration technology.



方志丹  
Fang Zhidan

中国科学院微电子研究所  
主要贡献：先进封装基板工艺开发。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of advanced substrate process.



戴风伟  
Dai Fengwei

中国科学院微电子研究所  
主要贡献：晶圆级封装工艺开发与产业化。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D and transfer of wafer level packaging.



周云燕  
Zhou Yunyan

中国科学院微电子研究所  
主要贡献：系统集成设计仿真技术开发。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of design and simulation technology.



刘丰满  
Liu Fengman

中国科学院微电子研究所  
主要贡献：先进封装产品技术开发与应用。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of product technology and application promotion.



孔令文  
Kong Lingwen

中国科学院微电子研究所  
主要贡献：先进封装基板技术产业化。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: Transfer and industrialization of advanced substrate.



李君  
Li Jun

中国科学院微电子研究所  
主要贡献：系统集成设计仿真技术开发及应用。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of simulation and application.



薛海韵  
Xue Haiyun

中国科学院微电子研究所  
主要贡献：先进封装产品技术开发与应用。

Institute of Microelectronics, Chinese Academy of Sciences  
Main contributions: R&D of product technology and application promotion.