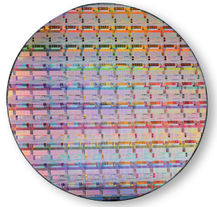
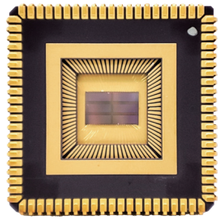
Research Group of Phase Change Memory
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences

微结构表征设备双球差电子显微镜
Cs-corrected TEM

The phase change memory (PCM) research group in SIMIT have focused on the fundamental theory and application-oriented research of PCM. The group proposed the theory of octahedral unit with three-dimensional confinement, developed Sc-Sb-Te phase change materials featuring picosecond switching and discovered the brand-new 'crystalline-liquid' transition mechanism in single element Te switching device that provides a novel solution for three-dimensional high-density PCM. The group have developed 4 to 128Mb PCM chips by collaborating with SMIC, which have been applied to the power grids and microsatellites. They released the first embedded PCM chip in China and the independent intellectual property rights have been granted on materials, devices, integration process, chip design and applications. With the strong support from SIMIT and XINCHU, the group are devoting themselves to the mass production and extensive application of PCM chips, and have laid a solid foundation for the independence and nationalization of the advanced data storage industry in China.



12 英寸相变存储器晶圆
12-inch PCM wafer



相变存储器芯片
PCM Chip

Outstanding contributors of this research group

Song Zhitang

Set up the phase change memory research in China; Proposed the theory of octahedral unit with three-dimensional confinement; Developed brand-new Sc-Sb-Te phase change material and single element Te switching material; Established a 12-inch trial line of PCM to complete the verification of key IP materials and the industrialization of PCM chips.

Li Xi

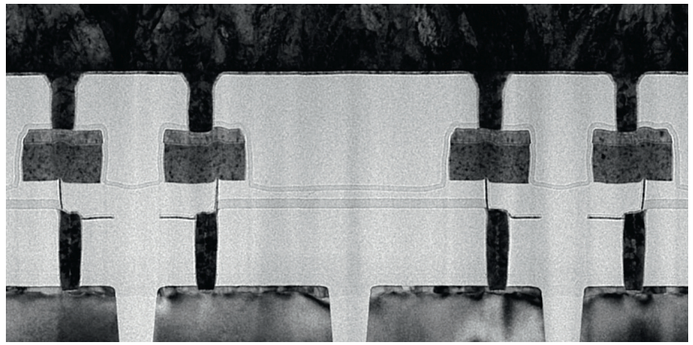
In charge of the PCM design and product development, Leading the chip design and application of the first embedded mass-produced PCM chip as well as the application of computing in memory using phase change memory. Responsible for the cooperation with Huawei and other companies for developing PCM chips and applications.

Song Sannian

In charge of the development of PCM materials and processes, and the development of phase change materials for mass production. Responsible for the PCM R&D platform and the cooperation with YMTC and other companies to promote the industrialization of PCM.

Major contributors

Zhu Min
Liu Weili
Chen Houpeng
Chen Xiaogang
Lei Yu
Zhou Xilin



芯片截面
Cross-sectional image of PCM cell

研究团队合影
Research group photo

相变存储器研究集体

推荐单位：中国科学院上海微系统与信息技术研究所

研究集体主要科技贡献：

该研究集体专注于相变存储器（PCM）理论基础和工程应用研究，提出了八面体基元与三维限定可逆相变理论，开发出皮秒级 Sc-Sb-Te 材料，提出了晶态－液态新原理单质 Te 开关器件，为三维高密度 PCM 提供了新方案。与中芯国际等合作研制出 4-128Mb PCM 芯片，并用于电网和小卫星，量产业界首款嵌入式 PCM 芯片，在芯片材料、器件、工艺、设计和应用全环节形成了自主知识产权。依托研究所和上海新储集成电路有限公司，正在实现 PCM 产品系列化和大规模推广应用，为先进存储产业自主可控和国产替代奠定了基础。

研究集体突出贡献者

宋志棠 Song Zhitang

宋志棠 中国科学院上海微系统与信息技术研究所
主要科技贡献：开辟我国相变存储研究方向，提出八面体基元与三维限定理论，开发ScSbTe与单质Te开关材料等。建立12英寸工程化平台，组建产业化团队，实现PCM自主材料芯片验证与产业化。

李 喜 Li Xi

李 喜 中国科学院上海微系统与信息技术研究所
主要科技贡献：负责PCM设计与产品开发，负责首款嵌入式量产PCM芯片等设计与应用，负责相变存算一体应用。负责与华为等公司合作开发PCM芯片和应用。

宋三年 Song Sannian

宋三年 中国科学院上海微系统与信息技术研究所
主要科技贡献：负责PCM材料与工艺开发，开发量产PCM存储材料。负责PCM研发平台，负责与长江存储等公司合作，推动PCM产业化。

研究集体主要完成者

朱 敏 刘卫丽 陈后鹏 陈小刚 雷 宇 周夕淋

芯片测试现场
chip test

研讨现场
workshop