张 国 飙

15828385601
1085713360@qq.com

工作经历

1996 年、2001 年一至今　　美国 3D-ROM 公司，首席科学家

张国飙博士是“三维存储”和“三维计算”领域的开拓者，提出多项原创性概念。三维存储通过三维结构来延续摩尔定律，并已实现量产；三维计算利用三维架构来满足高性能计算应用（如超算、人工智能、网络安全、大数据等）的苛刻要求。张博士的贡献包括：

1）发明三维只读存储器（3D-ROM，为最通用的三维存储）（1996 年），获得美国专利 US 5,8385,396（1998 年）。该专利为三维存储的基础专利，被该领域半数以上（>470 项）美国专利引用，并被《EDN》杂志（全球发行量最大的电子类杂志）封面报道（2001 年）。目前，张博士暨团队在三维存储领域拥有 60 余项有权有效中美专利；

2）以专利授权的方式，与美国 Matrix 半导体公司（总投资 2 亿美元）合作，量产了业界第一款 3D-ROM 产品—3D-OTP（2003 年）。产品用于 Mattel（全球最大玩具公司）等的产品中，月销量百万颗级。Matrix 半导体公司入选《Red Herring》杂志“100 Companies that will shape the future”（2002 年）；

3）2017 年 3 月，英特尔公司（美国最大的处理器商）和镁光公司（美国最大的存储器商）联合推出基于 3D-XPoint 技术的 Optane 存储盘。该技术被称为“未来十年最有突破性的存储技术创新”。3D-XPoint 是一种 3D-ROM，它使用了张博士的至少 5 项中美授权专利。

4）在业界首先提出三维计算（3D-COM）。3D-COM 在微尺度下将存储与计算有机地融合在一起，以超大的带宽和超高的容量（均比传统技术高至少三个数量级），极大提升大数据分析、网络安全、人工智能和超算的性能。张博士在该领域发明了智能 ROM（iROM）、三维查毒处理器（3D-AV）、三维人工智能处理器（3D-AI）、三维超算处理器（3D-SC）和现场编程计算阵列（FPCA）等技术。

1996 年－2001 年，美国德州仪器公司（TI），高级设计工程师

1990 年－1995 年，美国加州大学伯克利分校，博士研究生

教育经历

博士	美国加州大学伯克利分校	1995 年
硕士	美国加州大学伯克利分校	1992 年
本科	中国科技大学少年班	1986 年－1990 年

获奖情况

第四届中国创新创业大赛 电子信息行业 第一名 （2015 年）
100 余项中美授权专利

张国飙博士迄今总获得 **106** 项中美授权发明专利，包括 64 项美国授权发明专利和 42 项中国授权发明专利。

中国授权发明专利

（共 42 项）

专利号	授权日	发明名称
98119257.2	02/7/17	集成电路中的似电容元件
98119572.5	03/1/22	三维只读存储器及其制造方法
02131089.0	06/11/15	三维集成存储器
02131352.0	07/3/14	光刻编程系统
02113333.6	07/4/11	改进的三维掩膜编程只读存储器
02150106.8	07/12/12	三维掩模编程只读存储器之只读存储元
03145665.0	08/4/23	电编程三维只读存储元
03108107.X	08/4/23	低成本光刻技术
01129103.6	08/5/14	三维只读存储器集成电路
200610153561.0	09/3/25	基于 nF 开口的三维掩膜编程存储器
200610159412.5	09/5/6	三维电编程只读存储器
02150190.4	09/5/6	三维存储器
200410040968.3	09/7/1	三维存储器系统芯片
03145663.4	09/7/29	基于电编程三维存储器的集成电路自测试方法
200610159413.X	09/9/9	二极化的三维只读存储元
200510059914.6	09/11/4	非整数位系统
200510059916.5	09/11/4	混合型非整数位系统
03145662.6	09/12/2	电编程三维集成存储器
200610153562.5	09/12/23	基于三维存储器进行自测试的集成电路
200810185313.3	10/10/6	采用微晶半导体材料的三维只读存储器
200810184151.1	11/10/26	三维只读存储器
200810183943.7	11/12/21	改进的三维只读存储器
200810181778.1	12/1/18	改进的三维掩膜编程只读存储器
200810183684.8	12/6/27	三维存储器集成电路
200610100860.8	12/9/26	三维 N 进制掩膜编程只读存储器
200710194280.4	12/11/7	基于三维存储器的三维存储模块（3D2-M2）
200810186013.7	12/11/14	采用二极化存储元的三维只读存储器
200710048243.2	13/4/24	具有预留空间的掩膜编程存储器
201010194950.4	14/12/24	多位元三维掩膜编程存储器
201110042197.1	15/6/17	保密型三维掩膜编程只读存储器
201310091513.3	15/9/2	小晶粒三维存储器
201310080698.8	16/2/3	存储、模拟和数字功能分离的三维存储器
201210319920.0	16/2/3	压印存储器
201310247028.0	16/2/24	飞机精准着陆辅助装置

201310080461.X	16/3/3	含有集成中间电路芯片的三维存储器
201280042089.7	16/3/30	分离的三维存储器
201380002865.5	16/3/30	大面积停车位监控系统
201310079458.6	16/8/24	含有读/写电压产生器芯片的三维存储器
201280042212.5	16/9/7	三维印录存储器
201310080018.2	16/9/28	含有地址/数据转换器芯片的三维存储器
201210292373.1	16/12/21	三维可写印录存储器
201410050524.1	17/3/1	多位元三维掩膜编程存储器

美国授权发明专利

（共 64 项）

专利号	授权日	发明名称
5,485,031	96/1/16	Antifuse structure suitable for VLSI application
5,712,813	98/1/27	Multi-level storage capacitor structure with improved storage density
5,831,325	98/11/3	Anitfuse structure with improved manufacturability
5,835,396	98/11/10	Three-dimensional read-only memory
5,838,530	98/11/17	Applications of protective ceramics
6,111,302	00/8/29	Antifuse structure suitable for VLSI application
6,541,363	03/4/1	Antifuse manufacturing process
6,603,187	03/8/5	Antifuse structure suitable for VLSI application
6,717,222	04/4/6	Three-dimensional memory
6,812,488	04/11/2	Electrically-programmable three-dimensional memory-based self-test
6,861,715	05/3/1	Electrically-programmable three-dimensional memory
6,903,427	05/6/7	Mask programmable read-only memory based on nF-opening mask
6,906,361	05/6/14	Peripheral circuits of electrically-programmable three-dimensional memory
6,989,603	06/1/24	Low-cost lithography
7,071,849	06/7/4	Fractional-bit systems
7,126,196	06/10/24	Self-testing printed circuit board comprising electrically programmable three-dimensional memory
7,158,220	07/1/2	Three-dimensional memory system-on-a-chip
7,167,109	07/1/23	Hybrid fractional-bit systems
7,304,355	07/12/4	Three-Dimensional Memory-Based Self-Test Integrated Circuits and Methods
7,386,652	08/6/10	User-Configurable Pre-Recorded Memory
7,425,391	08/9/16	Highly-Corrected Mask
7,442,997	08/10/28	Three-dimensional memory cells
7,633,128	09/12/15	N-ary mask-programmable memory
7,728,391	10/6/1	Small-Pitch Three-Dimensional Mask-Programmable Memory
7,763,911	10/7/27	Three-dimensional memory cells and peripheral circuits
7,821,080	10/10/26	N-ary Three-Dimensional Mask-Programmable Read-Only Memory

7,847,283	10/12/7	Three-Dimensional Memory Cells
7,952,903	11/5/31	Multimedia Three-Dimensional Memory Module (M3DMM) System
7,952,904	11/5/31	Three-Dimensional Memory-Based Three-Dimensional Memory Module
8,564,070	13/10/22	Large Bit-Per-Cell Three-Dimensional Mask-Programmable Read-Only Memory
8,698,652	14/4/15	Large-Area Parking-Monitoring System
8,699,257	14/4/15	Three-Dimensional Writable Printed Memory
8,704,680	14/4/22	Improved Large-Area Parking-Monitoring System
8,884,376	14/11/11	Large Bit-Per-Cell Three-Dimensional Mask-Programmable Read-Only Memory
8,885,384	14/11/11	Mask-Programmed Read-Only Memory with Reserved Space
8,890,300	14/11/18	Discrete Three-Dimensional Memory Comprising Off-Die Read/Write-Voltage Generator
8,916,938	14/12/23	Three-Dimensional Writable Printed Memory
8,921,991	14/12/30	Discrete Three-Dimensional Memory
8,923,565	14/12/30	Parked Vehicle Detection Based on Edge Detection
9,001,555	15/4/7	Small-Grain Three-Dimensional Memory
9,024,425	15/5/5	Three-Dimensional Memory Comprising an Integrated Intermediate-Circuit Die
9,091,538	15/7/28	Laser Landing Altimeter for Precision Aircraft Landing Aid
9,093,129	15/7/28	Discrete Three-Dimensional Memory Comprising Dice with Different BEOL Structrues
9,093,153	15/7/28	Three-Dimensional Memory Comprising Discrete Read/Write-Voltage Generator Die
9,117,493	15/8/25	Discrete Three-Dimensional Memory Comprising Off-Die Address/Data Translator
9,123,393	15/9/1	Discrete Three-Dimensional Vertical Memory
9,190,412	15/11/17	Three-Dimensional Offset-Printed Memory
9,293,509	16/3/22	Small-Grain Three-Dimensional Memory
9,299,390	16/3/29	Discrete Three-Dimensional Vertical Memory Comprising Off-Die Voltage Generator
9,305,604	16/4/5	Discrete Three-Dimensional Vertical Memory Comprising Off-Die Address/Data-Translator
9,305,605	16/4/5	Discrete Three-Dimensional Vertical Memory
9,396,764	16/7/19	Discrete Three-Dimensional Memory
9,475,429	16/10/25	Night Detection of Parked Vehicles
9,508,395	16/11/29	Three-Dimensional One-Time-Programmable Memory Comprising Off-Die Voltage Generator
9,519,824	16/12/13	Night Parking Detection
9,558,842	17/1/31	Discrete Three-Dimensional One-Time-Programmable Memory
9,559,082	17/1/31	Three-Dimensional Vertical Memory Comprising Dice with Different Interconnect Levels
9,666,641	17/5/30	Compact Three-Dimensional Memory

9,666,237	17/5/30	Mixed Three-Dimensional Printed Memory
9,665,783	17/5/30	Night Parking Detection
9,666,300	17/5/30	Three-Dimensional One-Time-Programmable Memory Comprising Off-Die Address/Data Translator
9,688,197	17/6/27	Night Detection of Parked Vehicles
9,741,448	17/8/22	Three-Dimensional Offset-Printed Memory with Multiple Bits-Per-Cell
9,741,697	17/8/22	Three-Dimensional 3D-oP-Based Package

Selected Publications :

1. G. Zhang, "3D-ROM - A First Practical Step Towards 3D-IC", *Semiconductor International*, July 2000
2. G. Zhang, "Improving IC Yield with Protective Ceramics", *Semiconductor International*, pp. 217-220, June 2000
3. G. Zhang; Y. King; S. Elfoukhy; E. Hamdy; T. Jing; P. Yu; C. Hu, "On-state reliability of amorphous silicon antifuses", *Proceedings of International Electron Devices Meeting*, pp. 551-554, 1995
4. Guobiao Zhang; Chenming Hu; P. Y. Yu; S. Chiang; S. Eltoukhy; E. Z. Hamdy, "An electro-thermal model for metal-oxide-metal antifuses", *IEEE Transactions on Electron Devices*, Volume: 42, Issue: 8, pp. 1548-1558, 1995
5. G. Zhang; C. Hu; P. Yu; S. Chiang; S. Eltoukhy; E. Hamdy, "Reliable metal-to-metal oxide antifuses", *Proceedings of International Electron Devices Meeting*, pp. 281-284, 1994
6. G. Zhang; C. Hu; P. Yu; S. Chiang; E. Hamdy, "Metal-to-metal antifuses with very thin silicon dioxide films", *IEEE Electron Device Letters*, Volume: 15, Issue: 8, pp. 310 - 312, 1994
7. G. Zhang; C. Hu; P. Yu; S. Chiang; E. Hamdy, "Characteristic voltage of programmed metal-to-metal antifuses", *IEEE Electron Device Letters*, Volume: 15, Issue: 5, pp. 166-168, 1994
8. J. H. Huang; G. B. Zhang; Z. H. Liu; J. Duster; S. J. Wann; P. Ko; C. Hu, "Temperature dependence of MOSFET substrate current", *IEEE Electron Device Letters*, Volume: 14, Issue: 5, pp. 268-271, 1993