



What's After NAND?

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Contents

CONTENTS III

LIST OF FIGURES VI

EXECUTIVE SUMMARY 1

INTRODUCTION 2

NAND FLASH MEMORY 3

 NAND Flash Memory Technology 3

 Floating Gate Memory Cell Scaling Challenges 5

 NAND alternative: Charge Trapping Memory Cell 12

3D MEMORY ALTERNATIVES 20

 Conventional Approach 20

 Samsung Stacking by Single Crystal Deposition 20

 Concept 21

 Advantages and Disadvantages 26

 Challenges 27

 nonconventional approach 31

 horizontal channel – horizontal gate 31

 Concept 31

 Advantages/Disadvantages 35

 Challenges 37

 Vertical gate- Macronix TFT – Samsung VG-NAND 37

 Concept 37

 Advantages/Disadvantages 43

 Challenges 44

 Vertical Channel – Punch Structure 45

 Toshiba BiCS 45

 Concept - 1st Generation 45

 Advantages and Disadvantages 50

 Concept - 2nd Generation → p-BiCS 54

 Challenges 65

 Samsung TCAT 68

 Concept 68

 Advantages 71

 Disadvantages 71

Challenges.....	72
Hynix Vertical Cylindrical Floating-gate	73
Concept.....	73
Advantages.....	78
Disadvantages.....	79
Challenges.....	79
Vertical Channel - Channel Wrap-around Structure.....	80
Samsung VSAT – Vertical Stacked Array Transistor	80
Concept.....	80
Advantages.....	84
Disadvantages.....	84
Challenges.....	85
Cross-point Memory Arrays.....	86
Concept.....	86
Storage Element.....	91
PCM.....	91
VCM.....	98
PMC.....	102
STT-MRAM	106
Advantages/Disadvantages and Challenges	113
COMPARISON OF 3D MEMORY CONCEPTS	114
Cell Size	114
Disturbs	117
Process Complexity.....	119
Cell Efficiency	121
Yield	121
Performance.....	121
Endurance	122
Retention	123
Power Consumption.....	124
Scalability	125
Cost.....	126

Summary	132
OUTLOOK.....	134
Roadmap	135
REFERENCES	136
ABOUT THE AUTHORS	141
ABOUT NAMLAB	143
Contact	144
ABOUT FORWARD INSIGHTS	145
Services	145
Contact	145
SERVICE OFFERINGS*	146

About the Authors

Florian Beug is Senior Technical Analyst for emerging memory technologies at Forward Insights. Florian's career spans 10 years in the field of non-volatile flash memory. He was memory cell engineer responsible for 48nm floating gate and 36nm floating gate NAND flash development and the pre-development of 2xnm floating gate and charge trapping NAND flash memory at Qimonda AG. In addition, Florian was a member of the NAND flash pre-development team at Infineon focusing on 75nm, 63nm and 32nm TwinFlash/NROM charge trapping technologies and also worked on embedded floating gate flash cells of Infineon Technologies, STMicroelectronics and Philips Semiconductors/NXP.

He is the author or co-author of more than 30 publications in the field of reliability, degradation characterization, and modeling of future NVM technologies and holds patents in this subject area.

Florian holds a Masters degree in solid state physics and a Ph.D in Electrical Engineering both from the University of Hannover, Germany.

Thomas Melde is a Scientist at NaMLab GmbH responsible for charge trap flash device characterization, simulation, and reliability modelling. Thomas' Ph.D. thesis focused on charge trap flash device development at the Flash pre-development team of Infineon/Qimonda, Dresden. He also worked as a research assistant at the Fraunhofer Institute, Division Design Automation, Dresden.

Thomas Melde received his diploma degree in electrical engineering at the Dresden University of Technology, Germany.

Thomas Mikolajick is Head of the Chair for Nanoelectronic Materials and Scientific Director at NaMLab GmbH. He is also Head of the German Society for Materials Science (DGM) working group "materials for non-volatile memories" and coordinator of the Cool Silicon Cluster <http://www.cool-silicon.de/>. Previously, he was the Head of the Institute for Electronic- and Sensor Materials at TU Bergakademie Freiberg and lead new memory technologies and flash memory pre-development at Infineon Dresden.

Thomas holds 174 patents and received his Ph.D. in Electrical Engineering from the FAU Erlangen-Nuremberg, Germany.

Stefan Slesazeck is a Scientist at NaMLab GmbH responsible for concept evaluation, hardware development, electrical characterization and modelling for resistive memories. Prior to NaMLab, he was a project leader for the pre-development of new memory concepts with Qimonda Dresden (Germany) focusing on concept evaluation for 1T – DRAM including floating body devices, cell concepts, access schemes for WL-driver and sense amplifier. As a device engineer at Infineon Technologies, Stefan focused on the module development of 3D DRAM access devices in 65nm and 46nm buried word line technology and pre-development of 3D DRAM access devices for FinFET and EUD.

Stefan received a Ph.D. in microelectronics from the Dresden University of Technology, Germany.

Josef Willer is Vice President of Process Technology at Forward Insights. His expertise lies in the area of semiconductor memories including DRAM, NOR, NAND, NROM and alternative memory technologies including FRAM, MRAM, RRAM, phase change memory, nanocrystal memory, SONOS memory, spin-torque RAM and probe memory and the related intellectual property.

Josef has 26 years of research and development experience in semiconductor memories at Siemens Semiconductor/Infineon Technologies/ Qimonda AG. Prior to joining Forward Insights, Josef was a principal at Qimonda Flash GmbH responsible for evaluating patents and intellectual property and developing innovative non-volatile memory technology and novel cell concepts to overcome the ultimate technology scaling constraints. He was named Infineon's Inventor of the Year in 2004 and is member of the technical committee for the International Memory Workshop (IMW).

Josef holds a Dr. rer. nat. from the Technical University in Munich in solid state physics.

Gregory Wong is the Founder and Principal Analyst of Forward Insights. Greg has in-depth knowledge of the cost, performance and markets and applications of 2-bit per cell NOR, NROM and NAND flash, 3-bit per cell and 4-bit per cell NAND and 4-bit per cell NROM flash technologies as well as solid state drives. Greg has 11 years of management experience in strategic planning, business development and engineering at Hitachi, Siemens, ProMOS and Infineon/ Qimonda. At Infineon/Qimonda, Greg was responsible competitive intelligence and reverse engineering for flash memories focusing on flash memory vendors' strategies, process technologies, design architectures, product performance, manufacturing capabilities and costs.

Greg earned his B.A.Sc. degree in Electrical Engineering from the University of Toronto, and his M.B.A. degree from the Richard Ivey School of Business in London, Ontario.

About NamLab

NaMLab (**N**ano-electronic **M**aterials **L**aboratory)

The research at NaMLab focuses on materials for electronic devices and new device concepts. Among these are high-k materials for capacitors, transistors and other applications, novel switching devices including memristors, nanowire based electronics as well as materials for energy harvesting devices such as solar cells.

Future nano-electronic products require the development of new materials that are not currently available. NaMLab consequently focuses its research activities on materials and applications that show the potential to offer significant advantages over materials and products used today. In addition to investigating and characterizing new materials, NaMLab is undertaking research on the integration of these materials into semiconductor products with nano-scale dimensions.

NaMLab, originally founded as a research joint venture between Qimonda AG and the TU Dresden in July 2006, has its roots in the Corporate Research Department of Infineon AG and is now owned completely by the Technical University of Dresden. NaMLab receives basic financing from the Saxon Ministry of Science and Arts (SMWK). The company benefits from excellent working conditions in its office and clean room building opened in October 2007 and located within the TU Dresden campus.

Characterization:

- physical characterization (conductive AFM, SSRM, SEM)
- electrical device characterization;
 - 200mm/300mm wafer probe stations
 - 80K – 500K temperature range
 - Analytical measurements of memory cells (lifetime, switch time , storage and deletion windows)
 - charge carrier mobility with Hall and split-C(U)
- optical characterization (FTIR ellipsometry, μ Raman and photoluminescence)
- dielectric reliability (TDDB, BTI, SILC)
- high-k material development
 - oxides: AlO, TiO, ZrO, HfO and mixtures
 - metals: Al, Pt, Au, TiN, Ti, Ru
 - methods: ALD, MBE, PVD, evaporation

Development:

- materials for emerging memories
- high-k stacks for capacitors and transistors
- development of new memory concepts
- charge trap device development
- development of explorative devices based on silicon nano wires

Contact

NaMLab gGmbH
Noethnitzer Str. 64
01187 Dresden
Germany
T +49.351.21.24.990-00
F +49.351.475.83.900
E-mail: info@namlab.com

namlab
nanoelectronic materials laboratory

www.namlab.com

About Forward Insights

Forward Insights provides independent, insightful market research, consulting and information services focusing on semiconductor memories and solid state storage. The company offers unparalleled depth and understanding of the strategic, market and technical complexities of the semiconductor memory landscape.

Services

The professional services offered include:

- Strategy Consulting
- Financial, Technical and Investment Due Diligence
- Financial & Cost Analysis
- Market Forecasts
- Technology Analysis
- Competitive Analysis
- Patent and Intellectual Property Analysis
- Surveys
- Training
- Custom projects

Contact

12 Appian Dr.
North York, Ontario
Canada M2J 2P6
Tel.: +1-408-565-8207
E-mail: greg@forward-insights.com



Forward Thinking.

www.forward-insights.com