

## REMARKS FROM 2010 GSA MEMORY CONFERENCE COMMITTEE CHAIR

The GSA Memory Conference, held in Taipei on March 16, 2010, ended with great success. This event is the first-ever industry event to address the theme "Bridging Memory and Logic ICs for Better System Performance" and dedicated to all memory companies, system houses, and semiconductor companies. The Conference not only touched on mainstream memory and emerging memory, but also addressed the opportunities to integrate logic and memory. We are pleased to report the feedback from attendees was very positive regarding the overall event. Memory is such an important topic in our community, and we were very pleased with the showing of over 300 attendees.



Dr. Chih-Yuan Lu  
President  
Macronix

To sustain the impact of the conference, *The 2010 GSA Memory Report* records the key perspectives and insights from the distinguished speakers and the companies they represented at this conference. To conduct this report, GSA collaborated with the Industrial Economics and Knowledge Center (IEK), the industrial research arm of the Industrial Technology Research Institute (ITRI), a long-term associate to GSA, and the report was also reviewed by GSA's memory committee. As emerging system devices and related technologies appear to be an important trend in the semiconductor industry, this report, accordingly, intends to create greater awareness of emerging memories, system device applications, market prospects, and related technology development.

I would like to extend my most sincere thanks to all the committee members, GSA, event sponsors, the Co-organizer: CIEE (Chinese Institute of Electrical Engineering), and report sponsors including Etron Technology, Macronix International Co., Ltd., and IEK. Please enjoy it.

With best regards,

**Dr. Chih-Yuan Lu**

Chair, 2010 Memory Conference Organizing Committee, GSA

President, Macronix International Co., Ltd.

## EXECUTIVE SUMMARY

On March 16, 2010, the Global Semiconductor Alliance held the first-ever GSA Memory Conference in Taipei. This unique conference brought together industry leaders, representatives from distinguished companies, world famous speakers, and analysts from research institutes to discuss "Bridging Memory and Logic ICs for Better System Performance." With this theme as the pillar for this report, the authors from the Industrial Economics & Knowledge Center (IEK) in Taiwan refer to the speakers' presentations, comments from industry experts, and include their own impartial views.

In future applications, electronic products will increasingly call for higher performance, lower power consumption, greater cost effectiveness, smaller size, and better reliability. By blending memory and logic ICs, these needs can be better served.

Short channel effects, junction leakage, high aspect, and difficult-to-fill dielectrics pose great challenges for the miniaturization of mainstream memories. As a result, it is becoming more difficult to scale down DRAM and NAND Flash.

One way to address this challenge is to pursue system integration of logic and memory, by employing design and packaging technologies. In response, more companies are focusing on SoC (System-on-Chip), SiP (System-in-Package), and TSV (Through Silicon Via) as possible solutions.

SoC is a design technology now commonly used for process homogeneous integration which is relatively easier compared to heterogeneous integration. The more difficult heterogeneous integration applies packaging technologies such as SiP and TSV. TSV is still under development, but promises to become a mainstay technology alternative in the next ten years.

The scaling and performance limitations encountered by mainstream memories need radical innovation. Emerging memories will request to deal with issues of performance, size, and cost.

Most emerging memories are still at the R&D stage, with the exception of FRAM (Ferroelectric RAM), which is in production, and PCM (Phase Change Memory, also known as Phase-change Random Access Memory or PRAM), which is in pre-production.

PCM owns the attributes of DRAM and NAND Flash, including write endurance, read latency, and bit alterable. It can be used as a memory for code execution, and can replace part of or even the entire DRAM in the system. FRAM can be used in RFID (radio frequency identification), smart card, and portable consumer electronic products, while MRAM (Magnetoresistive RAM) is applicable in aeronautics, space, and automotive industries, etc.

DRAM and NAND Flash industries are both capital-intensive. From an analysis of ROE (Return on Equity) and net margin of the industries, it is clear that most manufacturers are not making a profit as they are in fact commodity markets. To turn this situation around, it is recommended that the manufacturers should move toward bringing value to customers to remove the focus on price competition. By integrating logic and memory and developing next-generation memory, these manufacturers will be able to improve their overall performance and create new value to end customers.