2000 IEEE/SEMI® Advanced Semiconductor Manufacturing Conference And Workshop

"Advancing the Science of Semiconductor Manufacturing Excellence"

ASMC 2000 PROCEEDINGS

The IEEE/SEMI Advanced Semiconductor Manufacturing Conference and Workshop is an annual forum that provides a venue for the presentation of methodologies, approaches and techniques required to achieve world class semiconductor manufacturing. A key role this conference plays is in promoting interaction among semiconductor professionals at all levels. The goal and objective of the conference are to assist in making the participating companies more knowledgeable of semiconductor production methods, encourage open communication between participants, and develop the strategic relationship between users and suppliers needed to achieve manufacturing excellence and improve global competitiveness.

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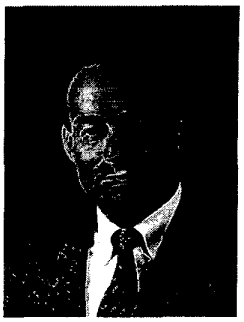
Welcome to ASMC 2000



I would like to welcome you to the 11th Annual IEEE/SEMI Advanced Semiconductor Manufacturing Conference. The ASMC takes place during remarkable growth in our industry as we see the internet, communications, as well as the base computer semiconductor businesses fuel demand that in most circumstances is beyond the capacity of our industry. After several years of slow growth this has been a very welcome change to our industry, but where the focus has shifted from reducing costs to finding ways of getting more out of the installed base. The fundamentals of both is to increase fab productivity and this is the area with which the ASMC can help the semiconductor professionals.

The ASMC is the premier conference of the industry on improving semiconductor fabs productivity through yield improvements by defect detection and reduction, advanced processes and equipment to shrink die size, tool productivity/capacity increases, factory dynamics, and productivity improvements through teaming with equipment suppliers, manufacturing, and engineering as well as ensuring a well educated workforce that is focused on improving the full fabs productivity.

At ASMC 2000, we have set up the conference into sessions with presentations on the most up to date industry leading practices. Each session will be focused around an area of productivity, which we hope will foster and stimulate exchanges between the presenters and attendees. In addition we are again fortunate to have three keynote addresses. On day one, George Scalise, President of the Semiconductor Industry Association, will give the keynote on the outlook of the Semiconductor Industry; day two we will again have a presentation by GartnerGroup/Dataquest, which will be given by Klaus Rinnen, Director, Semiconductor Manufacturing Analysis Group, on Capital Spending and Fab Equipment Outlook; and day three we will have Bernard Meyerson, IBM Fellow and Vice President, Telecom Technology IBM Research Division give a presentation on The Emergence of Silicon Germanium Technology in Communications.

All presentations at ASMC are peer reviewed and selected by a dedicated team of industry professionals who have many years of experience in all aspects of the semiconductor business and whose goal is to deliver a conference that all attendees can learn something and take back to their fabs. Without this group ASMC could not take place and I would like to personally thank them all for their time and effort. I would especially thank Patricia Gabella, the ASMC Technical Chair for all her efforts for ASMC 2000, as well as Kim Conway, our General Chair for years of dedicated service to ASMC. Of special note and thanks is Margaret Kindling whose coordination is key to the success of ASMC.

In 2001, we will begin alternating ASMC between Europe and Boston as well as changing the conference timing to the spring to accommodate the growth of the industry in Europe and to coordinate with ISSM. The conference next year will take place April 23-24, 2001 in Munich, Germany. The ASMC committees will continue to dedicate themselves to delivering the top quality conference in the industry, and we look forward to expanding our European participation.

From all of the ASMC committee members we hope you find ASMC 2000 informative and are able to learn and take back with you new and useful techniques for improving your business.

William J. Miller – 2000 ASMC Conference Chairman
IBM Microelectronics

ABOUT THE ASMC SPONSORS

Semiconductor Equipment and Materials International (SEMI) is a global membership-based trade association serving more than 2,400 companies around the world that provide equipment, materials and services to the $65 billion semiconductor and flat panel display industries. SEMI maintains offices in San Jose, Austin, Boston, Brussels, Hsinchu, Moscow, Seoul, Singapore, Tokyo and Washington, D.C. SEMI trade shows, sited worldwide SEMICON expositions, are just one of the many events that SEMI organizes. SEMI services include market data collection and reporting programs, technical and industry education programs, industry communications , worldwide public policy activities, export assistance, educational publications and audio/visual materials.

In addition, SEMI supports the development of standards that have become recognized as the only resource for manufacturing specifications accepted by the worldwide microelectronics industry. These standards incorporate the needs and recommendations of suppliers, customers, and industry consultants. Over 4,000 volunteers from every semiconductor region in the world, who serve on standards technical committees, work together to develop draft documents that are then balloted to members of the SEMI International Standards Program. The result of this effort is over 440 specifications covering process gases, process chemicals, equipment automation/hardware, equipment automation/software, facility specifications and safety guidelines, materials, microlithography, packaging, and traceability of importance to the global semiconductor and flat panel display industries.

Industry professionals, business experts, and respected members of the academic community and research institutions discuss the latest technological advances and timely industry issues at SEMI organized events scheduled throughout the year in the United States, China, Europe, Japan, Korea, Russia, Singapore, and Taiwan. These meetings provide opportunities for industry experts to exchange valuable technical knowledge. For information write to: SEMI, 3081 Zanker Road, San Jose CA 95134, USA.; phone 1.408.943.6900. For up-to-date information, visit the SEMI website at www.semi.org.

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The Electron Devices Society (EDS) and the Components, Packaging, & Manufacturing Technology (CPMT) Society are two of the 36 technical societies within the Institute of Electrical and Electronics Engineers, which, in turn, is the largest professional engineering organization in the world with over 350,000 members. It is transnational, with conferences and chapters in most countries. EDS and CPMT also sponsor a number of other related conferences:

- VLSI Chip Packaging Workshop
- Semiconductor Thermal and Temperature Management (SEMI-THERM) Symposium
- International Electron Devices Meeting (IEDM)
- International Symposium on Semiconductor Manufacturing (ISSM)
- Intersociety Conference on Thermal Phenomena in Electronic Systems (I-THERM)
- Electronic Components & Technology Conference (ECTC)
- International Electronic Manufacturing Technology (IEMT) Symposium

Copies of past proceedings of some of these conferences are available for purchase. In addition, EDS and CPMTS publish the Transactions on Semiconductor Manufacturing, the archival journal in this field. We invite you to consider membership for one of the IEEE Societies and to participate with us in furthering advancements in these fields. If you already belong to another professional society, you can affiliate with EDS or CPMT at reduced fees. Please refer to the back cover for additional information.

2000 ASMC ORGANIZING COMMITTEE

Our special appreciation to the following people who together volunteered countless hours to the organization of the IEEE/SEMI Advanced Semiconductor Manufacturing Conference and Workshop:

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Introduction to the 2000 ASMC

The 11th Annual IEEE/SEMI Advanced Semiconductor Manufacturing Conference (ASMC) has come into its second decade. ASMC continues to bring to the participants an excellent conference program focused on the business, operations, technology and manufacturing of semiconductors. These microchips (and nanochips) are the heart and essence that drive the electronics revolution. This revolution includes the Internet, the World Wide Web, global telecommunications and networking, computers that now fit into one hand and the ease and portability of world wide communication, data gathering and data manipulation. Eleven years ago the Internet was only available to a small few and the World Wide Web was being proposed. The overall electronics industry is now a major market affecting the global economy and semiconductors make that all possible. As ASMC 2000 opens, the industry is in a year of growth and expansion which puts a strain on the human and capital resources which make manufacturing possible. The conference brings information and ideas to help make the industry productive during these growth times.

This year's program again brings a premier selection of presentations in the areas of business, operations, technology and manufacturing of semiconductors. ASMC 2000 includes excellent articles in the areas of educating and training the workforce, cost and profitability, equipment productivity and effectiveness, factory dynamics, defect reduction for yield enhancement, defect source methodology, yield analysis and modeling, process specific yield, process control, advanced processes for lithography, etch, front end of the line deposition, cleaning, and chemical mechanical polish. In addition, another fine poster session will be held on day one of the conference.

We have the great honor of having three fine keynotes again this year, opening each day of the conference. Opening ASMC is George Scalise, President of the Semiconductor Industry Association, who will look at the future of semiconductor industry and global impact. Day two, Klaus Rinnen, Director of Development for the Semiconductor Manufacturing Analysis Group at Dataquest (Gartner Group) will give an update on capital spending and the equipment industry. On the last day of the conference, Bernard Meyerson, IBM Fellow and Director of Telecom Technology in the IBM Research Division, gives a talk on the emergence of silicon germanium technology in communication, enlightening the ASMC community on the alternative technology platforms that have been developed to expand performance.

Our panel this year on day two promises to offer some stimulating challenges to ponder. Entitled "Dare to Share", Ajit Manocha, Senior Vice President and General Manager of MOS3 and MOS4YOU will lead ASMC in a discussion encouraging more open exchange among manufacturers during the pre-development phase of a technology node to help continue the acceleration of electronics technology. Come prepared to share your views on an interesting and occasionally controversial subject.

ASMC is a great opportunity to know your peers, exchange ideas, challenge each other and hold open discussions. The best of the best in semiconductor manufacturing are at the conference, so do not miss the opportunity to develop relationships and engage in two-way interaction.

ASMC would not continue to be the excellent conference that it is without the dedicated volunteers on the committees that drive and guide the conference, seek out excellent articles and topics for presentation and give of their time to make this an outstanding conference. The ASMC committees would also like to recognize and thank Margaret Kindling, SEMI's Program Manager, East Coast Industry Programs, for all the hard work and effort in making ASMC a premier event. Additionally, the committee would like to thank IEEE and SEMI for their continued sponsorship of this conference. ASMC welcomes MICRO magazine's assistance and support this year.

As we head into another positive growth year for the semiconductor industry, ASMC continues to strive to provide a forum of the exchange of ideas towards making the semiconductor industry productive. The committee welcomes your suggestions and inputs to continue to make this conference an excellent event.

Have a great conference!
Patricia Gabella, ASMC 2000 Technical Chairman
Lithography Project Manager, Advanced Micro Devices at International SEMATECH

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