

SPECIAL INTEREST GROUPS (SIGs) AT THE 1998 IRW

Five Special Interest Groups (SIGs) were active during the 1998 IRW Workshop. These were: (1) The Thin Oxide SIG headed by Cleston Messick, (2) The Wafer Level Reliability (WLR) SIG headed by Andreas Martin, (3) The Low Cost CMOS SIG headed by Udo Schwalke, (4) The PMOS Hot Carrier SIG headed by Daniel Perry, and (5) The New Thin Oxide SIG headed by Raif Hajib. The SIG leaders have provided short summaries of their activities at this year's workshop.

Topic: Thin Oxides (Cleston Messick)

The oxide SIG is proceeding with using electron spin resonance to determine if we can tell a worn out oxide from a virgin oxide. We are getting input and help from Kodak, Fairchild, NIST, Keithley, Penn State and others.

Topic: Wafer Level Reliability (WLR)

This year a group of ten people met spontaneously to discuss WLR measurement methods. Very specific questions were raised as well as general issues were discussed such as: "Is WLR monitoring necessary and is it sufficient to detect all process changes?" Further action for the meantime until IRW'99 was not planned. At IRW'99 the WLR SIG will meet again with the focus on WLR monitoring. If you are interested and would like to contribute or get additional information, please contact Andreas Martin via e-mail: Andreas.Martin@Siemens-scg.com

Topic: Low Cost CMOS

This SIG will focus on the reliability issues of through-the-gate implantation (TGI). So far 3 participants from two companies (Roy A. Hensley, Jack Qian from Dallas Semiconductor and Udo Schwalke from Siemens) have expressed interest. The meeting was small but efficient. Both parties agreed to launch TGI hardware (short loop experiments) to investigate related reliability issues. Dallas Semiconductor will study TGI using gate oxide thickness down to approx. 7nm in a single workfunction (n+) gate technology. Siemens will investigate TGI effects on oxides below 7nm using also dual-workfunction (n+/p+) gate technologies. Besides different oxide thicknesses, the impact of various implantation conditions relevant to the particular technology generations on oxide reliability will be investigated. Each company will use their established oxide reliability tests (Qbd, Tbd, etc.) for an initial reliability assessment. We agreed to exchange and discuss the findings as soon as results become available.

Topic: PMOS Hot Carriers

After our two SIG meetings, we decided that the focus of our group, for the first year at least, would be to examine measurement and modeling techniques to improve lifetime prediction of MOS devices due to hot carrier degradation. We will initially focus in on PMOS devices, but will not exclude other devices.

Topic: Burn-In Strategies

A new SIG topic was proposed at the IRW '98 workshop, namely of burn-in strategies for IC's. The following attendees expressed interest: Bernhard Bang (Allied Signal), Prasad Chaparala (National Semiconductor), Abdullah Yassine (AMD), Alvin Strong (IBM), Gary Woffinden (Amdahl), Bill Vigrass (Texas Instruments) and Raif Hijab (Cirrus Logic).

One meeting was held, and the following questions were raised:

- 1) Is the intrinsic lifetime margin decreasing (voltage and/or temperature)?
- 2) When can voltage screen replace burn-in?
- 3) What market-tailored strategies, taking into account FIT rate targets and product volume, can allow the elimination of burn-in?
- 4) How effective is burn-in in catching the various failure mechanisms: oxide defects, ILD defects, metal defects, etc.

It is immediately apparent that there may be two divergent goals:

- A) For those who may have a product/customer alignment that makes burn-in a must, the focus is on optimizing the burn-in outcome. This would typically apply to complex, high ASP, and possibly low volume parts.
- B) For those who are in high volume, competitive market, where the cost of burn-in is a big burden, the interest would be in methodologies, including voltage screen and wafer level stress tests, which allow the FIT rate targets to be met without burn-in, or with drastically reduced burn-in.

A teleconference is to be called soon to define the focus, and the areas where collaborative discussion and investigation would be most productive.

This was a very active year for SIGs and all the hard work and enthusiasm of the SIG leaders is greatly appreciated by the workshop participants. As we look toward next year's meeting, please feel free to contact any of the workshop organizers to get more information about participating in or starting a new Special Interest Group!