Summary of IRPS Middle of Line (MOL) Workshop – April 2017

Moderators: Tian Shen (GLOBALFOUNDRIES), Adrian Chasin (imec), Shou Chung Lee (TSMC)

Attendance: 25 people across research centers, foundries and design houses

1. The moderators gave an introduction of the MOL TDDB issues, discussed possible breakdown mechanisms and inspired a discussion on the structure designs to isolate each breakdown mechanism.

2. The group reached a consensus that the geometric variation is the major concern in MOL TDDB. Thus a good process versus a bad process is mostly based on variability control, as indicated by the Samsung IEDM 2016 paper.

3. Statistics to use in MOL TDDB was discussed:
  a. Traditional Weibull statistics methodology is known to be incorrect and too conservative.
  b. Compound area scaling model is physically incorrect as two betas are given.
  c. The Integration method published by Fen Chen was discussed. A proposal was made that rather than testing the whole population to break down, only testing a short time and project from the low percentile is a more practical way.
  d. Clustering model was not discussed heavily
  e. Minimum space model for TDDB data was discussed. It was argued that inline CD measurement can be utilized to estimate the minimum space for a given area or run length and the TDDB model can be built based on the estimation of the space variations. However there is no consensus if the minimum space model is reasonable because the MOL structures are complicated and process effects cannot be simply described by minimum space

4. Voltage acceleration models were not discussed, as it is still under heavy debate and there is not deterministic physical evidence to favor one over the other.

5. A question about how to give a design rule to meet the special low PPM level reliability spec is raised. In response, a reliability calculator can be provided to calculate the PPM by adjusting usage conditions.