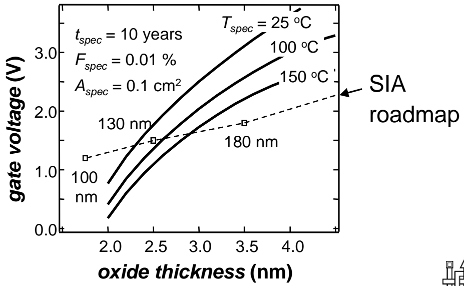
Gate oxide reliability insufficient below ~2.5 nm (IMEC 1999 technol.)



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Conditions for prediction

- Constant Voltage Stress
- Capacitors in accumulation
- Soft Breakdown = failure (noise criterion)
- measured at expected operating temperature
- Weibull statistics
- Weibull slope independent of T and VG
- log(tBD) vs VG is linear

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Optimize measurement and processing

- NMOS devices in inversion
  - destructive stress condition in invertor
- AC stress
- Test under "circuit condition"
  - transistor driven by another transistor
- Soft breakdown = failure ?
  - Check for device performance degradation
- Can processing improve the reliability prediction ?

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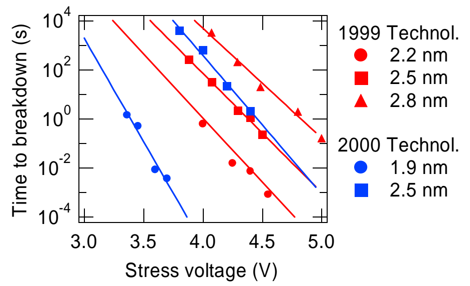
Room for process optimization



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