

# Thoughts on defect printability masks...

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# Defect printability mask standardization

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- [1] Programmed Defect Mask (PDM)
  - Include both phase and pattern defects
    - Arrays in a bright environment for inspection tool calibration
    - Arrays nested in 1D and 2D patterns
  - Phase defects (substrate defects) need to be characterized:
    - With AFM before and after ML coating
    - With blank inspection tool(s) before and after ML coating
  - Include best available fiducial marks on the masks
  - Measure defect locations relative to fiducials using two blank inspection tools (e.g., M7360 & Teron610)
  - Pattern mask with 1D and 2D patterns and alignment marks (e.g., XPA or SEM-based marks) in close proximity of the defects:
    - For the first sub-field, place the alignment marks based on the defect locations from the design layout
    - For a second sub-field, place the alignment marks based on the defect locations obtained from the blank inspection tool results
  - Measure the variation in location of the defects with respect to the alignment marks
  - Inspect with reticle inspection tool(s)
  - Wafer print through process, followed by wafer inspection
  - Review reticle defects with SEM and AIT and AFM
  - Review wafer defects with SEM



# Defect printability mask standardization

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- [2] Native Defect Mask(s) (NDM)
  - Include best available fiducial marks on the masks
  - Characterize a number of native defects using AFM before ML coating
  - After ML coating, measure defect locations relative to fiducials using two blank inspection tools (e.g., M7360 & Teron610)
  - Characterize selected defects after ML deposition with AFM
  - Pattern mask with 1D and 2D patterns and alignment marks (e.g., XPA or SEM-based marks) in close proximity of the defects:
    - Place the alignment marks based on the defect locations obtained from the blank inspection tool results
  - Measure the variation in location of the defects with respect to the alignment marks
  - Inspect with reticle inspection tool(s)
  - Wafer print through process, followed by wafer inspection
  - Review reticle defects with SEM and AIT and AFM
  - Review wafer defects with SEM