Development of a comprehensive metrology software platform
dedicated to block copolymers thin film nanopatterns

ABSTRACT

Block copolymers (BCPs) thin film nanopatterns have great potential applications for nanopatterning of integrated circuits manufacturing. The ability to self-assemble into periodic structures with aggressive pitches at affordable cost is of great interest for the semiconductor industry to be complementary to traditional lithography. Lamellar or cylindrical domains of BCPs can be used to create linear structures.

The full metrology process flow has to be compatible with both: fast R&D learning cycle time and low defect rate for production application.

In this poster, we propose a new generation of software infrastructure applied to the analysis of scanning electron & scanning probe microscopes images which can integrate specific business modules. For example, we will show the integration of a chemistry module dedicated to electronics materials like BCPs.

1. Image processing performances to reach 100% reliability
2. Management of simultaneously critical dimensions & defects
3. Automatic image classification
4. Fast software update to allow weekly process parameter and materials modifications
5. Customization of the software to the environment

NEW GENERATION OF METROLOGY SOFTWARE & INFRASTRUCTURE

- Software & library release every 2 weeks
- Agility methods to enable up to 24h reactivity to engineer’s requests
- Hybridization of heterogeneous data

APPLICATION TO DIRECT SELF ASSEMBLE FEATURES ON SEM AND AFM DATA

- Features: CD, Period, defect type & numbers, roughness, grain orientation, positional & orientational order quantification...

AUTOMATED IMAGE CLASSIFICATION

- Classification as a function of the defect model definition

STATISTICS MANAGEMENT

- Statistics of interest for each batch of images, each image and individual elements inside each image

CONCLUSION

- New generation of metrology software platform has been developed
- Integration of DSA features analysis modules with simultaneous features analysis
- Cylindrical image analysis and classification processing time below 0.2s per image
- Lamellar processing time 1s per image
- Agile methods and software infrastructure allow 100% robustness & software release every two weeks to follow processes roadmap (materials, process, features design variations...)

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