Tokyo Electron and imec to accelerate directed self-assembly (DSA) development

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Imec and Tokyo Electron (TEL) announce that they will accelerate their Directed Self-Assembly (DSA) activities at imec's recent 300mm fab-compatible DSA process line. Over the past two years, both companies have been actively engaged in DSA development. Based on promising results achieved on imec's 300mm DSA process line, imec and TEL will now expand their focus to explore DSA as a cost-effective and manufacturing viable patterning technique for 2x and beyond technologies.

Recent evaluations have demonstrated the feasibility of DSA to enable frequency multiplication through the use of block copolymers. Line features as small as 12.5nm and 25nm contact holes have been patterned on 300mm substrates at imec using pre-patterned lithography followed by DSA. In recent experiments using pre-patterned EUV holes, on wafers processed on TEL's CLEAN TRACK LITHIUS Pro coater/developer interfaced to ASML's NXE:3100, DSA repaired defective features, lowered line edge roughness (LER) and improved CD uniformity.

But for widespread DSA implementation, lower defect levels are required, and DSA needs to be integrated into existing process flows. Imec and TEL are therefore investigating various integration scenarios for line and hole patterning. Furthermore, comprehensive evaluations to understand material and process interactions on critical dimension (CD) uniformity, line edge roughness (LER) and defect levels are planned. Imec and TEL aim at delivering electrical functional devices using DSA.

To push the capabilities of DSA beyond lab-scale environments, the world first 300mm fab-compatible Directed Self-Assembly (DSA) process line all-under-one-roof was recently implemented in imec's 300mm clean room fab. In addition to TEL's especially configured DSA coater/developer managing gallon-sized quantities of block copolymers, and TEL's dedicated etch system supporting the DSA pattern transfer, imec has the necessary metrology, cleaning and pattern transfer toolsets. To complete the DSA process line and accelerate R&D on DSA at imec, TEL will provide imec with new hardware.

"With specially configured DSA coater/developer and etch systems at imec, we have the capability to explore DSA as a potential candidate for next-generation patterning technology", commented Chung Gishi, Executive VP of Tokyo Electron Ltd. "We hope to understand the critical processes necessary to move early stage development into volume production to benefit our customers".

"DSA continues to show much promise as part of the toolbox for advanced sub-20nm patterning. Our collaboration with Tokyo Electron has enabled us to rapidly implement DSA processing knowledge that has been developed in academia at the group of Prof Paul Nealey (University of Wisconsin at Madison) into a representative manufacturing environment. We are excited to extend this effort to dedicated newly developed DSA modules. Early access to this equipment allows us to identify and overcome the critical issues to make DSA ready for implementation into the manufacturing processes of our partners." commented Kurt Ronse, Director Lithography Department at imec.

Provided by IMEC

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