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Directed Self-Assembly

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Directed self-assembly (DSA) has been proposed as a potential "bottom-up" technology to augment or extend the capabilities of traditional and/or next-generation "top-down" lithography and overcome limitations with respect to resolution, uniformity, process complexity, and throughput. In particular, many promising capabilities of block copolymer-based DSA, including the ability to make sublithographic patterns with feature multiplication/interpolation, have been reported. Despite considerable advancements in recent years, much is still unproven and unknown regarding the capabilities (and limitations) of DSA as a viable lithographic technology.

As DSA attempts to make the jump from exploratory science to a real-world technology, one should keep in mind the old idiom "the devil is in the details." It is these details which are likely to be of interest to the readership of JM^3. The editorial staff, beginning with former editor-in-chief Dr. Burn Lin and continuing with the current editor-in-chief Dr. Chris Mack, believe that JM^3 is an ideal home for DSA-related research publications focusing on the performance, potential applications, and challenges of DSA as a practical lithographic technology for nanofabrication. We hope this special section will serve to introduce DSA to the readership of JM^3 and help attract future submissions in this area.

The first three papers in the special section discuss progress and learning in migrating various DSA processes to the 300-mm wafer scale:

- Rincon Delgadillo et al. report progress on implementing a chemo-epitaxy DSA process for L/S patterning.
- Gronheid et al. investigate the sensitivity of a graphoepitaxy DSA L/S patterning process on the quality of the guiding prepattern.
- Wuister et al. report progress on implementing a DSA process for contact hole patterning.

Since the utility of DSA will depend on the ability to transfer the block copolymer patterns into the underlying substrate, two papers dealing with this issue wrap up the special section:

- Muramatsu et al. present a wet development process using TMAH developer.
- Johnston et al. explore a plasma etch pattern transfer process in which inorganic materials are used to increase the etch contrast between block copolymer domains.

It is also fitting that the DSA special section is being published alongside a special section on Alternative Lithographic Technologies. DSA, while itself considered an alternative lithographic technology, may eventually play a role in enabling several other alternative lithographic technologies, including nanoimprint and maskless e-beam lithography. We encourage our readers to peruse these papers as well.

Finally, we would like to extend our thanks to all those authors who responded to our call for papers, as well as the SPIE journal staff for their tireless assistance in making this special section a reality.

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Guest Editors