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Directed Self-Assembly of Block Copolymers: Potential Applications and Direction

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Dimensional scaling allows for the fabrication of smaller and faster devices with increasing capacity. Reducing the size of the features comprising devices is mostly driven on advances in lithography. However, lithography only driven scaling reaches its limits and complex techniques such as multiple patterning are required awaiting the readiness of EUV lithography. Directed self-assembly (DSA) has been investigated as a complimentary patterning technique for several years, but has not yet made into production. The main merits of DSA lie in its potentials for cost reduction, CD uniformity improvement and dimensional scaling, achieving regular, dense patterns such as line/spaces and hexagonal arrays of holes of dimensions below 50nm. In this paper, the current opportunities and challenges for integrating DSA for IC manufacturing will be discussed, including targets and requirements for application to logic as well as memory technologies. Different aspects of the integration process for proposed flows will be analyzed, including process defectivity, design compatibility, manufacturability and cost of ownership.

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