Prototyping and Manufacturing Below 10-nm: Approaching Atomic-Scale Nanofabrication

Controlled nanofabrication at the sub-10-nm lengthscale requires combined advances in top-down and bottom-up nanofabrication. Bottom-up methods such as templated self-assembly permit large areas to be patterned, but the complexity and control of patterns is extremely limited. On the other hand, traditional methods of top-down lithography have focused on larger length scales. I will describe methods by which these two methods can be used in concert to achieve high resolution sub-10-nm length scale patterns across large areas.

I will start by describing methods of sub-10-nm lithography by using traditional electron beam lithography [1], as well as by using both helium-ion [2] and neon-ion lithography [3]. I will then discuss how these techniques can be used to template the fabrication of structures with structures ranging from simple arrays of dots [4] to complex interconnected lines with varying pitch and dimension [5], by using directed self-assembly.

References

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