INNOVATION PARTNERSHIPS
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Plasmonic Lithography for Patterning High Aspect-Ratio Nanostructures

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Manufacturing Process
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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OVERVIEW

High spatial frequency components in plasmonics and metamaterials for nanolithography

- Manufactures patterns with density and size beyond the light diffraction limit
- Creates smaller feature sizes, improved feature aspect ratios, and greater uniformity

BACKGROUND

Metamaterials are engineered to have special properties that are generally not found in nature. They use repeating patterns at scales much smaller than the phenomena they influence. Metamaterials have applications in nanolithography, which is the production of patterns with features on the nanometer scale. Nanolithography is the foundation for microelectronics, though semiconductor technology increasingly requires methods that can reduce the size and cost of product components. Advances in plasmonics and metamaterials for nanolithography allow smaller features to be produced with larger aspect ratios and improved uniformity, and a need exists for improved approaches in this realm.

INNOVATION

Researchers have created a technology that exploits the high spatial frequency components of specially designed masks in plasmonics and metamaterials to produce patterns with density and size beyond the light diffraction limit. This technology creates smaller feature sizes, improved feature aspect ratios, and greater uniformity than those which are achieved in existing nanoscale patterns. Theoretical analyses and simulation-based data support the claimed improvements. The technology favorably impacts the microprocessor industry, the

pattern-based magnetic storage industry, and the MEMS industry.

PATENT APPLICATION

Number: PCT/US2018/066869

References

1. Ok JG, Shin YJ, Park HJ, and Gun LJ. , A step toward next-generation nanoimprint lithography: extending productivity and applicability. Applied Physics A, November 2015, Volume 121, Issue 2, pp. 343-356.

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