



TECHNOLOGY

Nanolithography with Nanowire Arrays

OVERVIEW

Background

Integrated circuits are used in nearly all electronic equipment currently in production. Also known as microchips, they control everything from computers to cell phones to microwave ovens. The performance of these chips depends on features that are only a few tens of nanometers across and that can be assembled in extremely close proximity to one another. Currently, state of the art microchip manufacturing facilities cost \$3-4 billion to construct. Out of this, \$250-\$500 million goes towards producing and controlling extreme ultraviolet light (EUV), a key component in current production methods. In a rapidly evolving industry, these facilities must be rebuilt every few years and costs are only expected to rise as performance expectations increase.

Innovative Technology

Researchers at the University of Maryland have discovered a novel phenomenon that enables large-scale production of advanced microchips without the use of costly EUV: multiphoton-absorption-induced luminescence (MAIL). If one end of a nanowire made of a noble metal such as gold is irradiated with short-pulsed, near-infrared radiation, it can generate light that spans the visible spectrum into the ultraviolet. This light can then be used to etch nanoscale patterns with enhanced precision over a large area. By avoiding the use of EUV, which must be produced and manipulated under high-vacuum conditions and is difficult to control, the current method reduces fabrication costs tremendously while maintaining and perhaps improving on the benefits of costly EUV-based techniques.

Applications

- Computer chip fabrication
- Other applications of nanophotolithography

Advantages

- Can simplify requirements of computer chip manufacturing facilities by replacing EUV with near infrared light
- Greatly reduces cost of nanolithography

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Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials
- Industrial Processing
- Engineering
- Materials

EXTERNAL RESOURCES

- [US Patent 8,674,328](#)

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