Electron Beam Lithography

Fact Sheet
Technology

Application:

- Lithography for sub 10 nm resolution
- Template fabrication for Nanoimprint Lithography
- Lithography for high aspect ratio nanostructures
- Highly accurate and flexible fabrication for nanoelectronics & nanophotonics
- Nanostructures for biotechnology

Description:

The Electron Beam Lithography (EBL) is the pioneering lithography in the field of nanotechnology providing the highest resolution up to now. A focused electron beam with nanometer spot size is scanned across the surface to be patterned. Using a suitable combination of EBL tool, electron sensitive resist material and development process feature sizes of sub 10 nm can be resolved. EBL is a maskless lithography, where the electron beam directly creates the fine patterns with random shapes in positive and negative electron beam sensitive resists. Because of the serial pattern generation EBL suffers from serious throughput limitations. However, with high accuracy and flexibility EBL is the tool of choice for template production, prototyping and many other applications in the field of research & development and small volume production.

Proposal:

AMO offers a wide range of readily available EBL processes on many different substrate types, substrate sizes and applications. This includes processes for both positive and negative tone resists (PMMA, ZEP 520A, HSQ). Processes suitable to be followed by a RIE etching or a lift-off process, both also offered by AMO, are at hand. For the fabrication of high aspect ratio nanostructures special processes utilising super critical resist drying can be used. Processes using megasonic assisted development are also available. In addition to these ready-to-use processes AMO also offers on request the development of EBL processes for the special needs of our customers.

Specification:

Parameter	Positive Resist	Negative Resist
Resist	PMMA, ZEP 520A	HSQ, UVN30
Acceleration Voltage	50 kV, 100 kV	
Resolution	Sub 15 nm	Sub 10 nm
Substrate Material	Silicon, SOI, GaAs, Quartz, Ta_2O_5, Si_3N_4 Metallic surfaces: Ti, Cr, W, TiN, Ni, Al, NiSi	
Substrate Size	from samples of 10x10 mm² up to 6” wafer	
Tools	Leica EBPG 5000 (EB writer), SC Fluids (super critical drying), NanEqui (megasonic assisted development)	
Pattern Transfer	RIE etching, lift-off	RIE etching

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