

Negative Tone Resist Compositions For Lithography

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Inventors: Santu Nandi, Lalit Khillare, Mohamad G. Moinuddin, Sunil Kumar, Manvendra Chauhan, Satinder K. Sharma, Kenneth E. Gonsalves, Dr. Subrata Ghosh

ABSTRACT

The present invention provides negative tone resist compositions comprising a combination of R3 and RI and/or R2 for sub-12 nm dense and isolated feature patterning using electron (EBL) and helium-ion (HTBL) beam lithography process. These compositions have been successfully used for patterning 12 nm and above L/S features as well as features with different line and spacing starting from L/S to L/4S with feature size sub-12 and sub-10 nm. Also, complex nanofeatures such as 10 nm mesh structures and many other different types of complex nanofeatures have been successfully patterned. Also, the issue of shrinkage of inorganic resists during pattern development has been minimised using organics along with inorganics. The present resist composition finds applications in electronics fabrication.

KEY APPLICATION AREAS

- 1.Semiconductor photolithography.
- 2.Integrated circuit (IC) manufacturing.
- 3.Microelectronics and nanoelectronics fabrication.
- 4.MEMS and advanced semiconductor processing.
- 5.High-resolution micro/nano patterning.
- 6.Negative-tone photoresists for lithographic processes.

POTENTIAL USE

- 1.Fabrication of semiconductor devices and ICs using negative-tone photoresist compositions.
- 2.High-resolution photolithographic patterning for microelectronics, nanoelectronics, and MEMS fabrication.
- 3.Organic solvent-developed negative-tone resist processing for advanced lithography

workflows.

4. Pattern transfer for fine-feature micro/nanostructures in next-generation chip manufacturing.

5. Development and optimization of resist formulations for high-performance lithographic applications across semiconductor fabrication processes.