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Fusion of high precision nanopositioning and flexible nanomanufacturing technologies

The demand for high-precision positioning in the application of nanofabrication in macroscopic working areas is steadily increasing. The new level of complexity in micro- and nanoelectronic manufacturing imposes extreme requirements for high-precision nanopositioning over travel ranges of up to 200 mm and their combination with highly efficient nanostructuring methods. Over the past few decades, a variety of alternative processes have been established for the fabrication of nanostructures compared to optical lithography. For ultra-precise nanomanufacturing and measurement, both tip- and laser-based technologies offer significant advantages over other methods.

This contribution focuses on the role of tip- and laser-based measuring and manufacturing in nanotechnology and their enhancement through Mix and Match Lithography, supported by nanopositioning technology, which significantly improves accuracy in the placement and alignment of nanoscaled structures. These technologies allow the flexible and optimal use of different lithography techniques to realize customized micro- and nanostructures.

The integration of these approaches fosters innovative solutions in manufacturing, particularly in the semiconductor industry, sensors, and photonics.