ONGOING TRENDS IN PRECISION METROLOGY

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ABSTRACT

Continuing engineering progress in precision fabrication technologies, especially in the diversified micro- and nanotechnology, stimulates the advance in precision metrology, particularly in nanopositioning and nanomeasuring technology. Structures reach atomic dimensions, thus becoming more and more complex. Consequently, measurements are made – to an increasing extend - of larger surface regions and sidewalls with higher aspect ratios as well as fully 3D micro- and nano-structures.

Therefore, the resolution of nanomeasuring machines approaches the picometre level and the frequency stability of the laser sources is increased to the range of 10-10 to provide multiscale accuracy. Area-measuring optical sensors provide fast amount of data (> 5 Tbyte). Lateral highly resolved measurements are only possible by tip-based AFM single point probes but are extremely time consuming. Here, adaptive intelligent algorithms for optimum hierarchical measurement strategies are necessary. Multisenor instrumentation and multiparameter characterization provide additional challenges also in profoundly parallel data processing.

Newest achievements at the Competence Centre "Nanopositioning and Nanomeasuring Machine" as the successor of the Collaborative Research Centre SFB 622 are demonstrated, and ongoing research activities are presented.

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