Video-Rate Scanned-Probe Microscope
Technology #12597

Applications

The video-rate scanned-probe microscope has potential applications for any industry that requires high-resolution images obtained at high-speed. In particular, the semiconductor industry could benefit by using the invention in an Atomic Force Microscope (AFM) for dimensional metrology of artifacts such as semiconductor integrated circuits and photomasks. Additionally, the biological sciences field could use the invention to capture dynamic images of molecular and cellular behavior.

Problem Addressed

Scanning Probe Microscopy (SPM) technology creates images of surfaces through use of a probe that scans a specimen, such as a semiconductor wafer or a biological sample. To craft a specimen image, SPM involves (a) mechanical movement of the probe to scan the specimen and (b) recording techniques to log probe-surface interaction as a function of position. Scanning a surface through conventional SPM methods, i.e. with AFM, can take a considerable amount of time to achieve high resolution levels.

Technology

This invention offers a system to provide high-speed scanning based on AFM techniques. One possible embodiment of the system features a flexure-based scanner driven by an electromagnetic shear-mode actuator. To achieve high scan rates, the flexure mechanism is driven at its resonant frequency. The actuator configuration relies on a stacked-coil design, which allows for the same type of coil to be used for actuation of both the fast-scan axis and the vertical surface-following axis.

The mechanical design for the scanner includes a novel, two degree of freedom (DOF) method that allows each DOF to operate independently.

Advantages

- High-resolution imaging
- High-speed scanning

Categories For This Invention:

Electronics & Circuits
Semiconductors & Integrated Circuits
Semiconductor Manufacturing
Microscopy

Intellectual Property:

255 Main Street, room NE 18-501
Cambridge, MA 02142-1601
Phone: 617-253-6966 Fax: 617-258-6790
http://tlo.mit.edu
Contact the Technology Manager: tlo-inquiries@mit.edu
High-scan rate positioner for scanned probe microscopy
Issued US Patent
8,358,039
High-scan rate positioner for scanned probe microscopy
Issued US Patent
8,860,260

Inventors:
David Trumper
Ian MacKenzie

Publications:
High-Scan Rate Positioner for Scanned Probe Microscopy
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