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[54] **SCANNING PROBE MICROSCOPE HAVING CANTILEVER AND DETECTING SAMPLE CHARACTERISTICS BY MEANS OF REFLECTED SAMPLE EXAMINATION LIGHT**

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[63] Continuation-in-part of Ser. No. 672,857, Mar. 20, 1991, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **250/306**; 250/423 F
[58] **Field of Search** ..... 250/306, 307, 423 F; 73/105

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[57] **ABSTRACT**

A scanning probe microscope comprises a cantilever having a conductive probe positioned near a sample, an actuator for moving the sample to and away from the probe, a circuit for applying a bias voltage between the probe and sample to produce a tunnel current therebetween, a circuit for detecting the produced tunnel current, a circuit for detecting the amount of displacement of the probe resultant from interatomic forces acting between atomics of the probe and sample, thereby producing signals, a circuit for providing the actuator for feedback in response to the output signals from the circuit to retain constant the distance between the probe and sample, thereby causing the actuator to move the sample, a circuit for forming an STS image data from the detected tunnel current, a circuit for forming an STM image data from the detected tunnel current, and a circuit for forming an AFM image data. Thus, the STS, STP and AFM images are separately obtained simultaneously.

19 Claims, 17 Drawing Sheets