

IW0003

**Heatable Scanning Probes, from Data Storage to Nanolithography**

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IBM's probe storage technology, internally known as 'Millipede' project, featured massively parallel operation of > 1000 MEMS cantilevers fabricated by silicon micromachining techniques to perform simultaneous storage operations with high data rate. The information was stored in the form of indents in a polymer layer by heated tips at record densities of up to 4 Tbit/in<sup>2</sup>. The technology has now evolved to a nanolithography platform combining the high data rates and resolution from the storage device with a precise actuation of the levers to form nanometer accurate depth profiles in a thermally sensitive polymer resist. This nanolithography method called thermal scanning probe lithography (t-SPL) is competitive to traditional methods such as electron beam lithography in terms of throughput at sub 20 nm resolution. Moreover, the excellent imaging capabilities of the scanning probe and the direct write character enable a novel and intuitive approach to nanolithography. For example in so called closed loop lithography, the tool uses the imaged information to control the writing parameters on the fly and it achieves nanometer accuracy in patterning depth control. These capabilities are currently used to fabricate unique electrical, optical and nanofluidic devices.

**Keywords**

MEMS

polymer

thermal scanning probe lithography