

Abstract Submitted  
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**Design of a Self-Aligned, 300mK-300K Temperature range Magnetic Force Microscope(MFM) with <10nm Resolution** OZGUR KARCI, NanoMagnetics Instruments Ltd. & Hacettepe University, IVAN KNEZ, Rice University, HILAL ATALAN, NanoMagnetics Instruments Ltd., RUI-RUI DU, Rice University, AHMET ORAL, Sabanci University, NANOMAGNETICS INSTRUMENTS LTD TEAM, HACETTEPE UNIVERSITY TEAM, RICE UNIVERSITY TEAM, SABANCI UNIVERSITY TEAM — We present the design of a self-aligned MFM, operating from 300mK to 300 K. Unique ‘Self-Aligned’ design uses cantilever alignment chips and eliminates the alignment procedure and sustains the alignment across the full temperature range. The MFM is very compact, 23.6mm OD, and is adopted to fit into Oxford Instruments Heliox TL system. A fiber interferometer with  $\sim 12\text{fm}/\sqrt{\text{Hz}}$  noise level is designed and used to detect cantilever deflection. Stick slip coarse approach mechanism is used to bring the sample in to close proximity of the sample. We can also move the sample in XY directions within 3 mm range, while we measure the position with capacitive encoder with  $3\mu\text{m}$  accuracy. We can also operate the LT-MFM in high magnetic fields. The microscope has been successfully operated between 300mK-300K and we can achieve <10nm resolution. MFM images of 394 Gbps Harddisk at 1.5-300K and CoPt Multilayers at 350mK will be presented.

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