

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Low Temperature Scanning Probe Microscope(LT-SPM) operating in a Cryogen-Free Cryostat, 1.5-300K OZGUR KARCI, NanoMagnetics Instruments Ltd, MUNIR DEDE, NanoMagnetics Instruments Ltd., YURY BURGOSLAVSKY, RENNY HALL, Cryogenic Limited, AHMET ORAL, Sabanci University, NANOMAGNETICS INSTRUMENTS LTD. TEAM, CRYOGENIC LIMITED TEAM, SABANCI UNIVERSITY TEAM — We present the design of a Low Temperature Scanning Probe Microscope(LT-SFM) operating in a vibration-free cryogen-free cryostat. A 0.5W ultra low noise Pulse Tube cryocooler is integrated into the cryostat with a 9T magnet. Stick slip coarse approach mechanism is used to bring the sample in to close proximity of the sample. The sample can be moved in XY directions within 3 mm range, while the position is measured with capacitive encoder with $3\mu\text{m}$ accuracy. An improved fiber interferometer with $\sim 12\text{fm}/\sqrt{\text{Hz}}$ noise level is used to detect cantilever deflection. The resonance of the cantilever controlled by a digital Phase Locked Loop (PLL) integrated in our Control Electronics with 5mHz frequency resolution. We can achieve $\sim 1\text{nm}$ resolution in AFM mode & $< 10\text{nm}$ resolution in MFM mode. Results from different imaging modes; non-contact AFM, MFM, Piezoresponse, Conductive AFM etc. will be presented.

Ahmet Oral
Sabanci University

Date submitted: 30 Nov 2010

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