Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

mK-Scanning Probe Microscope(mK-SPM) operating in a Cryogen-Free Dilution Refrigerator at 20mK MUNIR DEDE, Nanomagnetics Instruments Ltd. Suite 290 266 Banbury Road OX2 7DL. Oxford, UK, OZGUR KARCI, Hacettepe University, Dept. of Nanotechnology and Nanomedicine, Beytepe, 06800, Ankara, Turkey, CHRIS SNELLING, Oxford Instruments plc Tubney Woods, Abingdon, Oxon OX13 5QX, UK, AHMET ORAL, Sabanci University, Faculty of Science and Engineering, Orhanli - Tuzla, 34956, Istanbul, Turkey — Dramatic increase in liquid helium price limits the usage of cryogenic equipment. Dry cryogen-free dilution refrigerators(DR) systems are promising platforms to run mK-Scanning Probe Microscopes(mK-SPM) systems with a number of operating modes: STM, AFM, MFM, EFM, SSRM, PFM, etc. We present the design of a mK-Scanning Probe Microscope (mK-SPM) operating in a cryogen-free DR. An Oxford Instrument cryogen-free DR(Triton DR200) with 200uW cooling power and 7mK base temperature is used for the experiments. A 1W Pulse Tube cryocooler is integrated into the DR. After wiring and attaching the microscope we achieved 20mK base temperature. Piezo driven Stick slip coarse approach mechanism is used to bring the sample in to close proximity of the sample. In these initial results we deliberately did not take any precautions to isolate the pumping lines, attached to the DR and the DR itself. The turbomolecular pump was attached directly to the top plate of the DR. We first tested our mK-SPM in Scanning Tunnelling Microscope (STM) mode as it is the most sensitive of the SPM techniques. An image, using a gold coated 6μm period calibration grating at 20mK, obtained under these rudimentary conditions.

Munir Dede
Nanomagnetics Instruments Ltd. Suite 290
266 Banbury Road OX2 7DL. Oxford, UK

Date submitted: 13 Dec 2011 Electronic form version 1.4