

Abstract Submitted  
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**Atomic Resolution imaging with non-contact Atomic Force Microscope (nc-AFM) in a closed liquid cell** UMIT CELIK, Istanbul Technical University, DEMET CATCAT, NanoMagnetics Instruments Ltd./Hacettepe University, H. OZGUR OZER, Istanbul Technical University, AHMET ORAL, Sabanci University, ISTANBUL TECHNICAL UNIVERSITY TEAM, NANOMAGNETICS INSTRUMENTS LTD. TEAM, HACETTEPE UNIVERSITY TEAM, SABANCI UNIVERSITY TEAM — We have designed a non-contact Atomic Force Microscope, which can achieve true atomic resolution in a closed liquid cell, which does not suffer from evaporation of fluids during imaging. We have designed a closed liquid cell, where we can flow the fluid using a syringe or a peristaltic pump. The AFM cantilever holder was designed to eliminate acoustical resonances. We can obtain resonance curves without spurious acoustic peaks in liquid using a piezoactuator. We have used an RF modulated 635 nm low noise diode laser. RF modulation is effective to reduce the optical feedback noise and the optical interference noise. Deflection noise density of designed system is  $\sim 20$  fm/ $\sqrt{\text{Hz}}$  in air and  $\sim 25$  fm/ $\sqrt{\text{Hz}}$  in water. The observed frequency noise at the PLL output was  $\sim 1\text{Hz}_{pp}$  in water using a 300kHz, 32N/m cantilever oscillated at 0.9nm amplitude with  $Q\sim 11$ . Force sensitivity of our system is demonstrated by imaging cleaved mica surface in water environment with atomic resolution.

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