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High-Resolution Combined Low-Temperature Scanning Tunneling/Atomic Force Microscope for 3D Force Spectroscopy B.J. ALBERS, M. LIEBMANN, T.C. SCHWENDEMANN, M.Z. BAYKARA, Yale University, M. HEYDE, M. SALMERON, Lawrence Berkeley Nat. Lab., E.I. ALTMAN, U.D. SCHWARZ, Yale University — We present the design and first results from a new home-built low-temperature scanning probe microscope enabling high-resolution experimentation in both scanning tunneling microscopy (STM) and non-contact atomic force microscopy (NC-AFM) modes. A tuning fork based Q-plus style sensor is used to allow for flexibility in choosing probe tip materials. The system features an on-top cryostat, where the microscope is enclosed in a double set of thermal shields. Tip as well as sample can be changed in-situ at low temperatures to keep turn-around times low. By opening the front shutters of the shields, unrestricted access from dedicated flanges permits the direct deposition of molecules or atoms on either tip or sample while they remain cold. As examples for the microscope's performance, we present data measured on Cu(111) in STM mode as well as on graphite in NC-AFM mode, featuring atomic resolution with corrugations of 4-5 pm and corrugations below 1 pm could be measured. In addition, atomic resolution data obtained by local force spectroscopy is shown.

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