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Development of a device-oriented UHV scanning probe microscope based on quartz sensors[1] JACOB TOSADO, WILLIAM G. CULLEN, MICHAEL S. FUHRER, University of Maryland — Scanning tunneling microscopy (STM) provides atomic-scale spatial resolution and performs local electronic spectroscopy of conducting materials. The recent emergence of graphene has highlighted the ability to tune carrier density by applying a gate voltage. However, preparation of samples as field-effect-transistors necessitates a dielectric substrate below the device, which is problematic for STM. Driven by the need to carry out high resolution imaging in ultrahigh vacuum, we are now developing an instrument which combines STM with atomic force microscopy (AFM) using a quartz sensor. This combination allows AFM approach and navigation, with uncompromised STM performance due to the very high stiffness of the quartz sensor. Primary features of the microscope design include in-situ exchange of probes and samples, with flexibility in probe and sample geometries and multiple contacts to both probe and sample. The microscope is housed in a UHV chamber with complete surface preparation and analysis capability. This talk will cover unique design features as well as testing of the microscope concept.

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