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Designing and Building a Combined Atomic Force and Scanning Tunneling Microscope CHENG JIE GU, CRAIG HOWALD, Marietta College — We report the design and construction of a combined atomic force microscope and scanning tunneling microscope (AFM/STM). Materials used were constrained to all be ultrahigh vacuum (UHV) compatible and for all structural materials to have similar thermal expansion coefficients thus minimizing thermal drift. In addition, significant effort was made to design for a high value of the lowest resonant frequency in order to reduce vibrational noise and its effects on the measurement quality. The coarse approach is accomplished with sequential elongation and contraction of three longitudinal segments on a piezoelectric tube. Using an interferometer, we verified that the sliding piece which carries the tip can be moved relative to the three segment tube on both nanometer and millimeter scales. Successful imaging in scanning tunneling mode is also shown.

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