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Design and Construction of a Scanning Tunneling Microscope for Atomic Scale Imaging of Surfaces in Ultra-High Vacuum ROBERT KILBOURN, CARL VENTRICE, Dept. of Physics, Texas State University, STEN THORNBURG, JAMES BURST, Dept. of Physics, University of New Orleans, VINCENT LABELLA, College of Nanoscale Science and Engineering, University at Albany — The outer layer of atoms of most materials either relax or reconstruct, which often results in a change in the electronic, magnetic, and/or chemical properties. Therefore, we have designed and constructed a scanning tunneling microscope (STM) for use in an ultra-high vacuum (UHV) based surface analysis system in the Surface Science Laboratory at Texas State. The instrument is capable of producing atomic-scale images on single crystal samples and allows transfer of samples to the horizontal manipulator of the system for surface preparation and high-resolution electron energy loss spectroscopy (HREELS) measurements. The main body of STM is constructed from Macor, which is UHV compatible and has a high strength to weight ratio, low thermal expansion coefficient, and low thermal conductivity. The instrument is mounted with springs with a 16" expansion length and has a resonant frequency of $\sim$1 Hz. The tube scanner is mounted to a UHV compatible inchworm for coarse approach. Custom designed analog electronics and software are used to control the instrument.

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